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agreed, at the Congress of Aix-la-Chapelle in 1818, to act together, and do away with the scourge of Christendom. And even then little was accomplished till France combined territorial aggrandizement with the rôle of a civilizing influence.—Poole, *Story of the Barbary Corsairs.*

Corset, a close-fitting underwaist made of stout cotton, linen, or silk, and stiffened with narrow bands of steel, whalebone, or similar substance. It is worn by women to insure well fitting gowns, and to support the skirts. The origin of the corset is unknown, but it is certain that the garment was worn in Cleopatra's time. For many centuries, the corset was little more than a bandage wound about the body. In the fourteenth century a corset was introduced which adapted itself to the figure. It was not worn, however, as an undergarment, but outside the other clothing. It was laced across the front, the edges being far enough apart to show an embroidered waist beneath. This garment was very popular, and in France was worn by both men and women. A hundred years later, a wooden corset made in two parts was worn for a time. Toward the close of the sixteenth century a corset made of thin metal slats in the form of lattice work was invented.

During the reign of Catherine de Medici of France lacing became fashionable. Catherine de Medici was vain and foolish. She prescribed thirteen inches as the proper measure for a woman's waist, and introduced a corset in the form of a steel cage or vise, which proved efficacious not only in compressing the waist, but in holding the body absolutely rigid after it was compressed. Queen Elizabeth's court was ever ready to ape the French; and men and women of both countries tortured themselves with these garments, in spite of a rapidly increasing death rate. Not until Henry IV of France issued an imperial order forbidding the use of these corsets was the injurious fashion stamped out. Many women evaded the law by having their dresses made with steels in the sides, and on the death of Henry IV corsets again became common among all classes. Early in the eighteenth century, the whalebone corset was introduced, and after that improvements were rapid.

At the present day there are more large corset factories in the United States than in any country in the world. The manufacture is interesting. The corsets are designed, cut, and fitted by men. The stitching is done by girls and women. The sewing machines are marvels of ingenuity. Some of them work with ten needles, often making from 1,600 to 1,800 stitches a minute. The corset is boned by hand. It is then trimmed, washed, starched, ironed, and shaped over heated blocks or forms. The best corset of today is not the rigid steel cage of Catherine de Medici's time. It is light and pliable, constructed with due regard to the different positions ordinarily taken during a day's work and recreation. It permits deep breathing, and in many instances is specially designed to enable the wearer to engage in the athletic sports so fashionable as well as healthful. The corset should not be a support for the body, but for the clothing, and if properly made and fitted is an easy and comfortable garment.

Corsica, a large island of the Mediterranean. It lies immediately north of Sardinia, 100 miles south of Genoa. Length, 116 miles; extreme width, 52 miles. The highest peak reaches an elevation of 8,889 feet. There are mines of lead and copper, plantations of olive, almond, and fig trees. Vineyards are numerous. The people are of Italian blood, language, and aspect. The island has belonged at various times to the Phoenicians, Carthaginians, Romans, Saracens, Pisans, and Genoese. It now belongs to France. Education is backward. Half of the people are unable to read and write. Local feuds are still bitter. The island is noted as the birthplace of Napoleon Bonaparte. See SARDINIA; NAPOLEON BONAPARTE.

Cortes, kôr′tĕs, the parliament or representative assembly—the congress—of Spain or of Portugal. The Cortes of Spain is an ancient body which has undergone many changes. Under the constitution, proclaimed in 1876, the present cortes consists of two independent houses—the Senate and the Congress. The Senate is composed of wealthy men in their own right—of 100 members appointed for life

by the crown and 180 elected members. The Congress includes one member for each 50,000 people. A measure must pass both houses before it can become a law. See CONGRESS; SPAIN.

Cortez, kôr′tez, **Hernando** (1485-1547), the Spanish conqueror of Mexico. He was a boy of eight when Columbus returned with his cargo of wonderful birds, animals, and products of the New World. At the age of nineteen we hear of him in the West Indies. At thirty-three he set out from Santiago, Cuba, for an exploration of Mexico. His force consisted of about 700 Spanish soldiers, 18 horses, and 10 small field guns. He landed at Vera Cruz, built a small fort, and burned his eleven small ships that his troops might have no occasion to think of them as a place of refuge. The details of the invasion are admirably told in Prescott's *Conquest of Mexico.*

Cortland, N. Y., a manufacturing city, situtaed on the Tioughnioga River, 38 miles northwest of Binghampton. It is the county seat of Cortland County. The Lackawanna, the Lehigh Valley and the Erie railroads enter. The principal manufactures are wire, wire cloth, corundum wheels, motor trucks, wall paper and carriages. It contains a State Normal School and the Cortland County Hospital. The water works are owned by the municipality. The population was 13,294 in 1920.

Corundum, a well known mineral. It is a compound of aluminum and oxygen. It is hard, ranking next to the diamond. There are three recognized types of corundum. The first is the gem called the sapphire. Five varieties are known. A second type is corundum proper. It differs from the gems only in lack of bright color. It is used as a polishing material. The third form is called emery, which is merely an impure corundum. There is an important corundum deposit north of Kingston, Ontario. Supplies are obtained also from New Jersey, Massachusetts, and the Carolinas. See SAPPHIRE; EMERY; GRINDSTONE.

Corydon, kŏr′ĭ-dŏn, a shepherd in one of the idyls of Theocritus, and in one of Virgil's eclogues. Hence the name is used in pastoral poetry and elsewhere to designate a shepherd or rustic. Spenser gives the name to a shepherd in the *Faerie Queene* and again in *Colin Clout.* Scott gives it to a shoemaker in *Count Robert of Paris.*

Cossacks, tribes inhabiting the southern and southeastern borders of Russia. Their origin is not understood. They seem of mixed blood, both Tartar and Russian. Some are settled as fishermen and graziers; but the typical Cossack leads a wild, free life on the steppes, not unlike that of the nomad Arabs. Their wealth consists in tents, horses, and cattle. They are permitted by the Russians to maintain a large degree of independence under chiefs chosen by themselves. Military service is the chief requirement made of them. Each

Cost of Living. See WAGES.

Costa Rica, kŏs′tä rē′kä, the most southerly republic of Central America. It extends from the Caribbean Sea to the Pacific Ocean, and from Panama to Nicaragua. The tenth parallel of north latitude passes very nearly through the geographical center. Area, 23,000 square miles. The coasts are fringed with tropical forests extending inland to an altitude of 3,000 feet. Oaks and chaparral come next. The vegetation of the mountain tops resembles that of the Andes. The highest peaks are volcanic. Eruptions have occurred no later than 1866. The wild animals are those of similar regions in South America—the armadillo, tapir, puma, deer, and numerous monkeys.

The people, about 400,000, are almost entirely of Spanish descent, with a few Indians and negroes. The little republic has a reputation for better schools and less illiteracy than any other country colonized by the Spanish. It threw off the Spanish rule in 1821, and has been independent since 1830.

San José, in the interior, is the capital. The government is modeled on that of the United States, though the Congress consists of one house. Gold, iron, copper, silver, petroleum, and coal are found in the mountains. Limón, the Caribbean port, is connected with the interior cities by several railways.

Bananas and coffee are the chief agricultural products, though corn, sugar cane, rice and tobacco are also cultivated. Of late years, apiculture has developed until there are about 3,500 hives of bees in the republic. Cotton goods, lard, drugs, flour, coffee bags and rice are the principal imports, and coffee, bananas, cocoa, hardwoods, sugar and hides the important exports.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Area, square miles	23,000
Population (1920)	468,373
Chief Cities:	
San Jose	38,930
Cartago	17,402
Heredia	13,885
Number of provinces	7
Number of deputies	43
National revenue	5,000,000
Bonded indebtedness	$30,000,000
Farm area, acres	13,343,000
Coffee, pounds	30,430,700
Bananas, bunches	8,652,473
Domestic Animals:	
Horses	64,717
Cattle	347,175
Swine	76,198
Imports	$15,000,000
Exports	$10,000,000
Miles of railway	402
Teachers in public schools	1,348
Pupils enrolled	32,836

Cotes, Sara Jeanette Duncan (1862-19), a Canadian novelist and journalist, was born in Brantford, Ontario. She wrote many novels, most of which deal with life in India. Among her books are *An American Girl in London; A Daughter of Today; Vernon's Aunt; The Story of Sonny Sahib;* and her novel of Canadian life, *The Imperialist.*

Cotopaxi, kō-tō-păks′ē, the most remarkable volcano of South America. It is situated in Ecuador, but a few miles south of the equator. Its upper portion is shrouded in perpetual snow. It presents a perfectly conical outline. Seen from the Pacific it is a magnificent peak, 19,550 feet high. Steam is issuing from the crater at all times. Since 1698 a number of tremendous eruptions have taken place, the latest in 1885. It is said that in 1744 thunder-like explosions and rumblings were heard 600 miles away.

Cotter's Saturday Night, The, a poem by Robert Burns, published in 1786. This is one of the best and most famous of Burns' longer poems. It describes the home of a Scottish peasant on Saturday, when the father from the field and the children from service "amang the farmers roun" gather in the humble cottage rejoicing that the week's work is over. The brothers and sisters visit together, "each tells the uncos that he sees or hears." They give a portion of their earnings to the mother and listen to their father's counsels. A guest arrives and is welcomed, the simple supper is eaten, and all gather "round the ingle" for family worship. Then they separate, the older children to return to work, the little ones to bed, and father and mother are left alone. See BURNS.

Belyve, the elder bairns come drapping in,
At service out, amang the farmers roun':
Some ca' the pleugh, some herd, some tentie rin
A cannie errand to a neebor town!
Their eldest hope, their Jennie, woman grown,
In youthfu' bloom, love sparkling in her e'e,
Comes hame, perhaps, to show a braw new gown,
Or deposit her sair-won penny-fee,
To help her parents dear, if they in hardship be.
Wi' joy unfeign'd brothers and sisters meet,
An' each for other's welfare kindly spiers?
The social hours, swift-winged, unnoticed fleet;
Each tells the uncos that he sees or hears;
The parents, partial, eye their hopeful years,
Anticipation forward points the view;
The mother, wi' her needle an' her shears,
Gars auld claes look amaist as weel's the new;
The father mixes a' wi' admonition due.

VOCABULARY.

belyve, by and by	*spiers,* inquires
tentie, heedful, cautious	*uncos,* news
braw, fine, handsome	*gars,* makes
sair, sadly, sorely	*claes,* clothes

Cottolene. See COTTON.

Cotton, the fiber which surrounds the seed of several species of the cotton plant. Cotton grows on a bushy herb two or three feet high. It is contained in a three- to five-celled pod which bursts open when ripe. The open pod is called a boll. The cotton fiber is intended by nature to enable the wind to carry and scatter the seeds as it does those of the milkweed, cottonwood, and dandelion; but man has discovered that the soft fiber may be twisted into thread, and the thread woven into cloth. Cotton is the great cloth plant

of the world. The crowded population of Japan, China, India, Egypt, and the inhabitants of all warm countries—half to four-fifths of the human race—wear cotton clothes the year round. The peasants of the countries named never wear anything else. The use of clothing, and particularly of cotton clothing, is increasing rapidly. There is little danger, therefore, of raising too much cotton. If the entire world were civilized and able to dress properly, the cotton looms would require 42,000,000 bales a year.

Cotton cloth appears to have been made and worn before the dawn of history in three centers,—India, Northern Africa, and Central America. Columbus found Indians wearing cotton cloth, and Cortez found the Mexican Indians proficient in weaving a native cloth. Europe got its first cotton cloth from India, by way of the caravan trade. Calico is the Calicut cloth of India; muslin, the Moosoul cloth of Mesopotamia; cambric is the cloth of Cambrai, a town in France where it was first made from cotton brought from India. Europe appears to have taken an interest in cotton weaving shortly after the discovery of America. At first people, accustomed to linen and woolen goods, thought cotton good enough for a royal wedding dress.

Cotton was known in our southern colonies from the earliest times, but merely as a dooryard plant—an ornamental flowering herb. In 1739 a bag of cotton was sent to England from Savannah. In 1784, at the close of the Revolutionary War, eight bags of American cotton were seized at Liverpool on a suspicion that the colonies could not have produced so much. About this date cotton growing began in the United States in earnest, and ten years later Charleston had 1,000,000 pounds to sell. The industry went on slowly at first, because the cotton had to be pulled from the seed by hand. In 1793 an inventive Massachusetts Yankee, by the name of Eli Whitney, resident in Georgia, devised a cotton gin. It consists of a hopper into which the bolls are poured. One side of the hopper is composed of parallel wires, between which circular saws, fixed on a swiftly revolving roller, turn with rapidity and whip the fiber through the slits, while the seeds, too large to follow, rattle down to the bottom of the hopper and out into a pile by themselves. This device, which, by the way, brought Mr. Whitney no end of lawsuits and little profit, enabled planters to prepare large quantities of cotton for market. In 1791 we sold England 189,000 pounds; in 1803 we sold her 41,000,000 pounds; in 1810 our exports were 94,000,000 pounds; in 1820 we sold 128,000,000 pounds; in 1830 we had 271,000,000 pounds to spare, and so on up to 1860, when the American production of cotton had reached the astonishing figure of 1,462,500,000 pounds or 4,685,000 bales of 300 pounds each. The cotton crop began to bring in so much money that Senator Hammond declared on the floor of the Senate, 1858, "Cotton is king."

In 1790 the first successful American cotton mill—a factory for spinning and weaving cotton—was established in Pawtucket, Rhode Island. English invention (see articles on HARGREAVES and ARKWRIGHT) had built up a great cotton-weaving industry in that country. America had but to import English machinery and begin work. Four years later a second mill was erected. By 1810 there were 102 mills and 31,000 spindles; twenty years later, there were 795 mills with 1,250,000 spindles, or 33,000 looms. When the Civil War came we had 1,000 mills, employing 100,000 people, and consuming 420,000,000 pounds of cotton a year.

The fertility of the soil, cheap slave labor, and the use of the cotton gin, enabled America to raise most of the cotton needed in the world's markets. Our Atlantic States, from Virginia southward, all the Gulf States, and Tennessee, engaged in raising cotton. During the Civil War it was difficult for Northern mills to get cotton. Prices rose till calico sold for twenty-five cents per yard. On account of the blockade, or guarding of the Southern ports by Federal ships, England could scarcely get shipments at all; and the so-called Cotton Famine in Great Britain followed. Other countries were not prepared to raise large amounts, and many

COTTON

1. Seed
2. Planting
3. Cultivating
4. Flower
5. Bolls
6. Plant
7. Handpicking
8. Machine picking
9. Cotton Press
10. Weighing
11. Gin
12. Shipping
13. Spinning, etc.
14. Weaving
16. Carpets
17. Cloth
18. Seed Products

English mills were obliged to close, throwing thousands and thousands of people out of work and causing great financial disasters. The high price of cotton, in time, stimulated greater production, particularly in Egypt and India. When the Civil War was over the cotton plantations of the South, with buildings burned, negroes gone, and foreign markets occupied by new growers, were simply ruined.

Of late the natural superiority of American cotton, the establishment of cotton mills near the cotton fields, and a system of cultivation by small renters rather than on the now impossible large plantations, have given American cotton and American cloth a new ascendency. The United States now produces more cotton than ever. Our Southern states grow 13,500,000 bales a year, or eighty per cent of the world's cotton. The American cotton crop for 1913 was valued at $798,000,000. Europe now pays the United States $1,000,000 a day for cotton.

Cotton culture is not unlike that of corn or potatoes. Fields are plowed and fertilized and the seed is dropped in hills. Warm, steamy weather helps the young crop on rapidly. The planting begins frequently in February. It continues for about two months. During May and June the plants are cultivated. This work is done with a big, long-handled hoe, and is called "chopping cotton." The weeds are "chopped" out, and the rows thinned by cutting out the poorer plants. Then, for two months or more, there is no work in the cotton fields. In many cotton-growing regions in the South, this is the one time in the year when the children can be spared to attend school. Cotton raising need not impoverish the soil. The cotton fiber itself draws its elements from air and water. In selling a bale of cotton, a planter sells no part of his soil. If the stalks be returned to the soil and the cotton seed be fed to stock, a cotton farm should not run down.

During the latter part of September cotton picking begins. The bolls open gradually, and, as the cotton is picked from the open bolls only, the picking lasts a long time. The first light frosts hasten the opening of the bolls, and the bulk of the cotton is picked usually in October and November. The cotton is seldom all picked by Christmas time, and fields are seen as late as March still white with cotton. Usually a thrifty cotton grower gets his cotton picked before time to plant the next crop; but there is sufficient reason for the expression, "It takes thirteen months to raise a cotton crop." A good field hand can pick 200 pounds a day. A cotton picking machine has been introduced. It runs astride of a row. Two cylinders catch the cotton. In place of the grain elevators seen farther north, the railroad stations of the cotton-growing states are provided with cotton gins and cotton-baling machines. After ginning, cotton is compressed by machinery and bound by strap iron into bales weighing about 500 pounds. It is then ready for market. The cotton gin turns out about two-thirds seed and one-third fiber by weight. A bale of cotton and half a ton of cottonseed may be regarded as a fair yield per acre.

The seed, not unlike green coffee in appearance, was formerly thrown away as waste, but is now put through a heavy press. It yields a large amount of cottonseed oil, and a refuse known as oil cake. Oil cake is fed to stock. Cottonseed oil is used for a great variety of purposes. It is the oil out of which cottolene, a substitute for lard, is made. About 6,100,000 tons of seed, formerly left to rot behind the gins, is now utilized.

Cotton fiber is ordinarily from one-half to two-thirds of an inch in length. A fiber is merely a hollow, flat, cellulose tube, with a spiral twist. An especially fine, soft cotton, called Sea Island cotton is produced on the islands off the coast of Georgia. The boll is small; the seeds are black. It has a fiber two inches long. This cotton cannot so far be made to grow with entire success on the mainland, or in other parts of the world. It commands a high price. It is said that a thousand mile thread has been spun from it so fine that it weighed but a pound.

Cotton raising is not without its difficulties. Insect pests are hard to overcome.

There are three serious insect pests, the cotton-stainer, the cotton-worm, and the cotton boll-weevil. The cotton-stainer is the least annoying. It is a species of insect in some degree like a chinch-bug, but longer. The body of the adult is red, with pale brown wing covers, marked with yellowish stripes. The young have black legs and red bodies. They feed by sucking the juice of the stems and buds of the cotton plant, and are especially dreaded because they stain the cotton in the opening bolls. They are also accused of puncturing the rinds of oranges so that the fruit soon decays.

The cotton-worm is the caterpillar of a small, night-flying moth. The moth lives over winter in the shelter of old grass. It lays its eggs in early springtime on the cotton plant when it is only an inch or two high. The caterpillars are hairy, green fellows, with black dots. They travel with a looping gait, like the cutworm and the measuring worm. The first generation hatches out in March. As soon as the caterpillar has matured and turned into a moth, the second generation travels northward and lays eggs. The Texas cotton worm moth is thought in this way to give rise to seven successive generations in the same growing season. The caterpillars strip the plants of their leaves and render a crop out of the question.

The cotton boll-weevil is a small, gray-reddish-brown, snout beetle about a quarter of an inch in length. It has a long, strong beak. It feeds on the cotton plant and nothing else. The adult female punctures the young cotton boll and deposits an egg. The egg hatches into a grub, which works inside the boll until it is ready to come out. It leaves a hole behind it through which moisture enters and utterly ruins the cotton. The cotton boll-weevil entered Texas from Mexico. It has been traveling northeastward at the rate of about seventy miles a year. The state of Texas offers a standing reward of $50,000 for a practical solution of the problem presented by this pest.

STATISTICS. The American cotton crop for 1920 was reported by the Department of Agriculture at 11,030,000 bales of 500 pounds each. The crop by states in running bales was as follows:

State	Bales
Virginia	22,000
N. Carolina	875,000
S. Carolina	1,475,000
Georgia	1,730,000
Florida	17,000
Alabama	715,000
Mississippi	946,000
Louisiana	300,000
Texas	2,700,000
Arkansas	830,000
Idaho	5,000
Tennessee	298,000
Missouri	60,000
Oklahoma	930,000
California	102,000
Arizona	75,000
Other	7,000
U. S.	11,030,000

CONSUMPTION.

	Spindles.	Bales.
United States:		
Cotton growing states.	10,429,000	2,476,000
All other states	17,589,000	2,723,000
Europe:		
United Kingdom	53,312,000	3,512,000
Germany	10,163,000	1,765,000
Russia	8,076,000	1,514,000
France	7,000,000	970,000
Italy	5,000,000	941,000
Austria-Hungary	4,352,000	795,000
Spain	1,900,000	327,000
Switzerland	1,497,000	110,000
Belgium	1,231,000	210,000
Portugal	451,000	62,000
Netherlands	425,000	85,000
Sweden	450,000	85,000
Denmark	78,000	23,000
Norway	76,000	11,000
Other European countries	220,000	75,000
British India	5,800,000	1,661,000
Japan	1,732,000	910,000
China	800,000	400,000
Brazil	1,000,000	375,000
Mexico	750,000	185,000
Canada	831,000	127,000
Other countries	215,000	55,000
Total	133,377,000	19,397,000

The corresponding totals for the year 1900 were:

Spindles	105,661,232
Bales	15,185,165

The leading states in the spinning of cotton are:

Massachusetts	9,415,000	1,155,000
North Carolina	2,861,000	609,000
South Carolina	3,617,000	591,000

	Spindles.	Bales.
Georgia	1,757,000	458,000
New Hampshire	1,318,000	247,000
Rhode Island	2,279,000	218,000
Alabama	934,000	202,000
New York	910,000	172,000
Maine	978,000	153,000

SUPPLY. The nearly 19,000,000 bales consumed by the cotton mills of the world were supplied by the following countries:

	Per cent.
United States	65.9
British India	14.8
Egypt	7.8
Russia	3.8
China	2.6
Brazil	2.2
All other countries	2.9

American cotton is exported from almost every station from which railways leave for Canada. Thus Minnesota and North Dakota appear in the list of cotton exporting states. The chief ports of cotton export in one year were:

	Bales.
Galveston, Tex.	2,301,000
New Orleans, La.	1,870,000
Savannah, Ga.	892,000
New York, N. Y.	619,000
Wilmington, N. C.	492,000
Mobile, Ala.	259,000
Brunswick, Ga.	176,000
Pensacola, Fla.	173,000
Boston and Charlestown, Mass.	156,000
Baltimore, Md.	117,000
Sabine, Tex.	108,000
Puget Sound, Wash.	101,000

The countries to which cotton is sent, and the number of bales exported to each in a recent year are as follows:

	Bales.
United Kingdom	2,956,000
Germany	2,385,000
France	889,000
Italy	418,000
Spain	262,000
Belgium	119,000
Russia	98,000
Austria-Hungary	90,000
Sweden and Norway	35,000
Netherlands	27,000
Denmark	4,538
All other European countries	22,000
Japan	200,000
Canada	113,000
Mexico	4,000
All other countries	4,000
Total	7,633,000

AMERICAN COTTON IMPORTATION.

Cotton fabrics	$13,460,000
Cotton yarns and threads	3,921,000
Threads, crochet and embroidery cottons	4,169,000
Knit goods	9,032,000
Lace curtains, laces and embroideries, edgings, etc.	33,611,000
Clothing ready made, not included in knitted goods	4,185,000
Total	$68,379,000

The United States imported in a recent year about 69,000,000 pounds of Egyptian cotton. This variety of cotton is now successfully grown in Arizona.

MANUFACTURE. The manufacture of raw cotton into cotton cloth and other fabrics, thread, etc., includes some of the most interesting of all industrial processes. In 1921 there were over 36,000,000 spindles, active and idle, in the United States, with a mill consumption of 4,690,000 bales of 500 pounds each, exclusive of "linters." There were approximately 1,500 cotton mills or factories, employing nearly 450,000 persons, with a total product considerably in excess of two billion dollars in value. Before going to the mill, the raw cotton must first be cleaned to remove sand, dust and other foreign substances. It then contains about two-thirds of its weight in seeds, which must be removed by the cotton gins already mentioned. Before the invention by Eli Whitney of the cotton gin, the removal of the seeds by hand was a slow and tedious process, and it would take one person two years to turn out an average bale of cotton, fit for the market, while one machine can now produce from three to fifteen bales a day. Whitney's cotton gin, known as the saw gin, contains a series of circular saws which tear the lint from the seeds and carry it through a guide into a receptacle. It is removed from the saws by a brush. Another form of gin, called the roller gin, is used for long-staple or Sea Island cotton, as it does not injure the fiber, though it only removes the seeds with one-fifth the rapidity of the saw gin. The roller gin has been used in Egypt and India in a primitive form for centuries.

When received at the mills the cotton from the different bales is mixed to insure yarn of uniform quality. It then passes

from the mixing hoppers through machines which open and loosen the fibers, work out lumps and remove impurities, such as remaining seed, dirt and leaves. Air suction then lifts the cotton to an upper floor, where any surplus trash is beaten out in machines called breaker and finisher lappers, and the cotton is carried forward and wound into rolls of batting, known as laps. These are doubled and drawn together to a thickness and weight as uniform as possible, and the laps then go to carding machines, in which the cotton passes over revolving cylinders fitted with wire teeth and the fibers are combed out so as to lie in parallel lines, forming a filmy web. This being gathered together forms a kind of rope, which is called "card sliver" and is then coiled up to await further processes.

The next step is to pass the card slivers through drawing frames, which treat them somewhat like "pulling taffy," and keep on doing it over and over again. Several strands of the sliver are few together to the machine, pulled through and come out as one. After several repetitions of this process, the result is a sliver of uniform weight throughout, with fibers lying nearly parallel. This is then taken to machines called slubbers, which draw out the fiber once more, twist it slightly to hold it together, and wind it on large bobbins. In this form the cotton is called "slubber roving." The large bobbins then go to "speeder" machines, which unwind the strands, draw the fiber out finer, and rewind it on smaller bobbins, ready to go to the spinning frames. Here the fibers are finally drawn out and then twisted firmly together by the action of the spindles, turning at a speed of about 10,000 revolutions a minute. This forms cotton yarn, which is then wound on bobbins, ready for dyeing and weaving into cloth.

Every step in the manufacture of cotton yarn has for its object, first, the removal of impurities; second, the attenuation, or drawing out, and strengthening of the thread; third, correction of mistakes or oversight in the previous processes. The thread may go through additional processes of "gassing" and polishing. In gassing, a smooth yarn is produced by singeing off the loose fibers, the thread being passed through a fine jet of gas while unwinding from one bobbin to another. Cotton yarn is polished by applying a coating of starch, beeswax, or some other material which not only gives it a gloss, but adds to its strength and weight. The process of weaving cotton cloth is similar to that of weaving silk and wool. See WEAVING.

There are four principal reasons for the extensive use of Egyptian cottons in the United States: (1) They are best adapted to mercerizing and other processes that give a high finish to cloth and cause it to resemble silk; (2) their exceptional clearness (freedom from nap) and luster, as well as their capacity for taking dyes, fit them for mixing with silk and for filling sateen, India linens, and similar goods having a brilliant surface; (3) the brown color of Mit Afifi fiber allows it to be used without dyeing in manufacturing goods, such as Balbriggan underwear and lace curtains, in which the ecru shade is desired; (4) they can be used for the manufacture of sewing thread and other articles which need to be very strong and for which no other type of cotton but sea-island is suitable. Owing to the higher price of the latter, Egyptian cottons can in many cases be advantageously substituted.

Except in cases where the brown-colored fiber is especially desired there seems to be little reason for preferring Egyptian to sea-island cotton, although one manufacturer reports that, within the range of the numbers used, the former furnishes a cleaner and better looking filling than either sea-island or peeler (long-staple upland) cottons. The highest grades of sea-island have longer and finer fiber than any other cotton, and therefore make stronger and finer yarns and thread. For these grades the Egyptian can not be substituted, but in manufacturing various classes of goods the somewhat lower price of Egyptian cottons allows them to be used to advantage in place of the lower grades of sea-island, especially when the supply of the latter is below the normal.

Apart from specific qualities of the fiber, American manufacturers give other reasons for preferring Egyptian cotton. They state that it is usually more carefully ginned, graded, and baled, and is apt to be freer from trash and short fiber, hence giving less waste in carding and combing than either sea-island or long-staple upland cottons. Egyptian cotton is also esteemed for its evenness of staple, the different grades showing little variation in this respect from year to year.

Egyptian cotton culture in the United States.— The Egyptian varieties are apparently best adapted to culture under irrigation in regions where there is practically no rainfall during the growing season. The only part of the United States where these conditions exist and where the summers are long and hot enough for profitable cotton culture is the extreme Southwest, from western Texas to southern California.

Since this type of cotton will continue to produce bolls and ripen fiber until a hard frost occurs, it is obvious that the largest yields can be obtained in regions where the autumn temperatures are highest. We must therefore conclude that the greatest success with Egyptian cotton is to be expected in southern Arizona and southeastern California—a conclusion that is supported by the experience so far gained. The valleys of the Salt River and of the Colorado River (Yuma Valley) in Arizona and the Imperial Valley in California have been found to be admirably adapted to the production of this type of cotton.

Cotton Boll-Weevil, an insect pest of the southwest. Cotton has many enemies. Some of these foes are diseases of fungous, that is to say, of plant origin. Wilt, soreshin, and rootknot beset the roots and stems. Leaf-spot, leaf-blight, and mildew attack the foliage. The bolls, with their precious contents of white fiber, are subject to rot and shedding. Animal foes are even more numerous. There are red spiders, plant lice, cutworms and caterpillars, webworms, and borers. A blue-green caterpillar, marked with black spots and stripes, known as the cotton-worm, is produced from the eggs of a brown moth. A similar caterpillar, known as the cotton boll-worm, is troublesome in gardens and cornfields, as well as in the cotton field.

The chief pest of the cotton grower, however, is the cotton boll-weevil, which is said in the year 1907 to have destroyed in Texas alone no less than 1,000,000 bales of cotton, worth $50,000,000 or $60,000,000. There are 11,000 beetles in the United States, but the home of this particular one is supposed to be Central America. The eggs of this weevil came to the United States, it is thought, in 1902, having crossed the Rio Grande into Texas in Mexican cotton brought to Brownsville to be ginned. The pest has spread northward and eastward, advancing like the Colorado potato beetle, at the rate of about forty-five miles a year, and is now troublesome in Oklahoma and in Mississippi. The beetle deposits its eggs in the square, or young blossom of the cotton plant. Instead of blooming and producing seed, with the white fibers so prized in commerce, the square wilts and falls off.

This Mexican weevil is a most serious menace to the cotton district. The United States Department of Agriculture has detailed specialists to fight it. Researches in Guatemala reveal the presence of a large red ant that makes a business of eating the weevils alive. In Central America these ants are numerous enough to prevent the spread of the insect. Colonies of ants were transported to Texas and began the work of devouring weevils, but our climate seems to be too dry for the ants. They have not prospered. Hopes of success from their aid have faded, though it is just possible that in the moister parts of the cotton belt, along the Mississippi and eastward, in climatic conditions more like those of Central America, the Guatemalan ant may prove helpful.

The cotton boll-weevil does not stand the American winter well. Comparatively few individuals live over. Several generations live and die during the same summer. It is not until late in the same year that the weevils are sufficient in number to master a cotton crop. Scientists are devoting themselves at the present time to the task of breeding an early cotton—a cotton that will mature in about 100 days, and be ready to gather before the weevil army has massed in the fields.

Those who are studying the situation have hopes, also, that aid may come from a native Texan fly. The flies are small creatures. They have been accustomed to lay their eggs in the larvae of a weevil that infests strawberry beds; but of late, they have taken a notion to plunge their eggs into the cotton-boll weevil. In some localities, they appear to have reduced the cotton-boll pest very remarkably. It is just possible that this new ally may prove as valuable in our cotton field as has the ant in Central America. At least, this is the hope of the Southern farmer.

In unusually dry seasons the cotton boll-weevil suffers from the drouth. Like its fellow countryman, the Guatemalan ant, it is found at these times lying on the ground shriveled up and dead.

Cotton Gin. See COTTON; WHITNEY, ELI.

Cotton, John (1585-1652), a Puritan divine. He was born at Derby, England, and was educated at Cambridge Univer-

sity. In 1612 he became vicar of St. Botolph's Church in Boston, Lincolnshire, for which our New England city was named. He leaned to Puritan doctrines. In 1633 he was cited to appear before Archbishop Laud to answer for not kneeling at a certain point in the services. To escape persecution he fled to Boston, Massachusetts, where he was held in high honor as a pastor. One would think that his experience might have made him charitable toward the religious views of others, but such was not the case. He was one of the foremost to hunt Ann Hutchinson out of Massachusetts Bay. Nevertheless, now that kindlier feeling prevails the world over, it is pleasant to learn that a tablet to his memory hangs in the old English church of which he was once the vicar. See PURITANS.

Cotton Picker. See COTTON.

Cottonwood. See POPLAR.

Couch Grass. See QUACK GRASS.

Coué, Emile, French pharmacist and healer by suggestion, was born of humble parents. In 1910 he had established his school for healing at Nancy, France, and it soon was in full operation, his consultations averaging 40,000 a year. He has cured innumerable persons, some of them of high standing. He makes no charge for his treatments, the running expenses of his school being taken care of by the admission fees charged for the public lectures which he gives. In 1923 Coué made his first visit to the United States, his object being the foundation of a school similar to the one at Nancy.

His working method is but another form of the principles laid down by William James, Henri Bergson, and others. One of Couè's chief assets is his "smiling goodness," and he asserts that "we possess within us a force of incalculable power." Some of his favorite expressions are: "We are what we make ourselves, and not what circumstances make us." "Every thought entirely filling our mind becomes true for us and tends to transform itself into action." The healing which Couè helps his patients attain is based on autosuggestion consciously applied, and he states that it will result beneficially to all, except two classes: (1) the mentally undeveloped who are not capable of understanding what is said to them; and (2) those who are unwilling to understand. The principle formula used is: "Every day, in every respect, I am getting better and better," which is to be repeatedly stated by the patient with confidence and faith. Success follows not by willing, but by an imagination which already sees as an accomplished fact that which is desired.

Cougar, the largest American animal of the cat family. It has a tawny color, resembling that of the deer. It is from 6 to 8 feet long and preys on deer, rabbits, other small animals, and birds. It is still found in the Allegheny Mountains, but rarely. Theodore Roosevelt's *Hunting Trips of a Ranchman* gives some account of its depredations. The skin of the cougar is much prized for rugs. A large skin is worth about $25. See CAT.

Council Bluffs, the county seat of Pottawattamie County, Iowa. It is said to have been named from the fact that in 1804 Lewis and Clark held a council with the Indians at this point. The city is located near the Missouri River, and is on the Union Pacific, the Chicago & North-Western, the Rock Island & Pacific, the Chicago, Burlington & Quincy and other railroads. Railroad and wagon bridges over the river connect Council Bluffs with Omaha and the city has acquired importance as a commercial center. Its manufactures include flour, paper, lumber, iron, agricultural implements, carriages, engines, and fire extinguishers. The city is well laid out and has fine buildings and beautiful parks. There is a public library, and the state institution for the deaf is located here. In 1920 the population was 36,162.

Council of Nice. See NICE.

Count, in spinning, the number given to thread or yarn to indicate the fineness. A "hank" of cotton contains 840 yards; when 60 such hanks are required for a pound, the thread is No. 60; if 80 hanks make a pound, it is No. 80, etc. The count of spun silk is made in the same way. The count of reel silk is based upon the number of thousands of yards to the ounce;

the count of worsted yarn, upon the number of hanks, each containing 560 yards, to the pound. The count of woollen yarns varies, but is usually based upon the number of thousands of yards to the pound. The count of linen yarn is based upon the number of "leas," each containing 300 yards, to the pound.

Counterfeiting, koun'tĕr-fĭt-ing, making imitations of money, either paper or coin. All countries punish the counterfeiter. For imitating paper money, the United States imposes a fine, not exceeding $10,000, and imprisonment for not to exceed fifteen years. For imitating coin, the fine is the same, with imprisonment not to exceed 20 years. For making small coins such as cents and nickels, the penalty is not to exceed $1,000 fine and five years' imprisonment. Similar penalties are prescribed by statute for having counterfeit money or counterfeiting tools in one's possession.

The government takes great pains to make the counterfeiting of paper money difficult. The paper used is a fine, firm kind of linen, made by a special process during which red and blue silk threads are mixed with the pulp in a way that is difficult to imitate. When bought from outside parties the government places the manufacturer under heavy bonds not to sell to private persons. The counterfeiter is obliged to imitate the threads of silk by colored marks made with a pen. Then, too, the engraving of the note is done by expensive machinery which a counterfeiter cannot afford to own. An examination of a note will show that a single line winds round and round, wandering, one might say, all over the face of the note, forming scrolls and designs without a single break or irregularity or difference in breadth. Even the most skillful engraver cannot reproduce this scroll work perfectly by hand. Very few persons not in the employ of the government have the skill to do it at all. Government detectives keep track of the movements and occupations of all persons who are supposed to have extraordinary skill in such work. The United States detective service gives a pathetic account of a New Jersey engraver, a most skillful man, whose utmost industry enabled him to produce only one $20 greenback per week. Instead of earning an honest living, which his skill would have enabled him to do easily, he seemed to have a passion for going to New York City to pass off his weekly bill. He was caught finally and sent to prison, a fate which is almost certain to overtake the counterfeiter. So implacable is the war waged against counterfeiters in the United States that moving picture producers are forbidden to exhibit films that show how counterfeit money is made. A large number of counterfeiters are arrested each year.

A favorite method of the counterfeiter is to raise the value of a bill from $2 to $20, but this is an exceedingly clumsy device and is detected easily. The government follows the policy of changing the designs of its notes quite frequently. Older bills are withdrawn from circulation. The work of counterfeiting bills is so difficult and requires so much skill that an engraver can make more money in the honest prosecution of his art.

It is easier to counterfeit coins. If the money could be cast it would be very easy indeed; but in order that a cast may be clear and sharp the metal must expand slightly in cooling, which is not the case with the precious metals. The counterfeiter must necessarily construct a sort of die with which to stamp his counterfeit money. The slightest irregularity or change in the stamp can be detected by a skillful banker. In the case of gold coins, the gold itself is worth as much as the coin, so that there is no profit in counterfeiting unless some cheaper material is used. A cheap material may be detected by its color, ring, and weight. For these reasons counterfeit gold coins are scarce. Silver coins, nickels, and cents are worth more than the material they contain. They are less difficult to counterfeit. Alloys of lead are used in place of silver; but the profit of counterfeiting in pure coin metal is quite sufficient to tempt the skillful rogue. Government detectives follow up all suspicious purchases of silver to make certain that the buyer intends to use it for honest purposes. When genuine silver is used, the only clue

to the counterfeit is in the patterns stamped on the faces of the coin. False silver coins sometimes counterfeit the genuine very closely. Having the same weight, ring, and color they are difficult to detect.

See COIN; MINT; MONEY.

Counting Glass, a magnifying glass used for the purpose of counting the threads in the warp or woof of woven fabrics. The magnifying glass or lens, usually small, is fixed in a small frame which is hinged to an upright. The upright is in turn hinged to a footpiece in which there is a square opening, one-fourth of an inch to an inch square. The three pieces of the instrument can thus be folded together and carried in the pocket. By the aid of the glass, it is an easy matter to count the number of threads crossing the square. The glass for counting threads in linen is called a Belfast linen prover.

Coursing, in the United States, following the large hare—the "jackrabbit"—with greyhounds. It is practiced chiefly in the prairie region west of the Mississippi from Texas northward. The hunt, on horseback, of course, is under control of a leader. When a "jack" starts up from his form in a tuft of grass two hounds are loosed. They follow by sight, but a course may extend over several miles. In a perfectly open country the odds are all against the hare. It jumps sideways or turns suddenly, allowing the hounds to pass; but unless it can reach rough ground, or get out of sight in cover, it has no chance for its life. The hound that catches the hare is not necessarily the winner. The hound that courses away leaving its competitor behind scores a point or two. The hound that overtakes and passes its competitor scores still more. Other scores are a quick turn at right angles, a turn at an acute angle, tripping the hare without seizing it, and actual killing. The various credits on points as previously agreed upon are kept on a card and footed. The hound having the greatest total is decreed the winner. The winners in two different couples are then matched for a course together, and so on. A hound wins a season according to the same rules that govern a winning football team. See HARE; DOG.

Courtenay, Edward Henry (1803-1853), an American mathematician, was born in Maryland. He was a graduate of the United States Military Academy, where he was assistant professor until 1824. From 1829 to 1834 he was professor of natural and experimental philosophy there; from 1834 to 1836 professor of mathematics at the University of Pennsylvania; and from 1842 to 1853 professor of mathematics at the University of Virginia. He was one of the engineers, from 1837 to 1841, in the construction of Fort Independence, and from 1841 to 1842 was chief engineer of the dry-dock work in the Brooklyn Navy Yard. He was translator of Boucharlat's *Elementary Treatise on Mechanics,* also author of *Treatise on the Differential and Integral Calculus.*

Court-Martial, a military court convened to try a soldier for an offense against military law, as mutiny, desertion, breach of orders, conduct unbecoming a soldier, etc. As provided by the statutes of the United States, a court-martial may consist of from five to thirteen commissioned officers above the rank of second-lieutenant. It may be convened by the commander. The members of the court must hold rank superior to that of the accused, that their chance for promotion may not be increased by his punishment. The finding of the court is of force only when approved by higher authority. In case of death penalty the finding must be approved by the secretary of war or the president.

Court of Industrial Relations (Kansas). The law establishing the Kansas Court of Industrial Relations was passed at a special session of the State Legislature, January 24, 1920. The legislature had been called to provide some measure to relieve the public from the dire results of the coal strike in the state, and this law was the result. Previous to assembling the legislature, the state had taken over some of the largest mines and was supplying the public with coal.

The law provides:

I. That the court shall consist of three judges appointed by the governor, by and with the advice of the senate. At the organization of the Court, one judge shall

be appointed for one year, one for two years and one for three years. Upon the expiration of the term of the three judges first appointed each succeeding judge shall be appointed for three years. Of the judges first appointed, the one appointed for the three-year term shall be the presiding judge, and thereafter the judge whose term of office has been the longest shall be the presiding judge.

II. The jurisdiction of the court shall be restricted to cases between employers and employes in the following industries:

1. The manufacture and preparation of food products whereby, in any stage of the process, substances are being converted, either partially or wholly, from their natural state into a condition to be used as food for human beings.

2 The manufacture of clothing and all manner of wearing apparel in common use by the people of this state whereby, in any stage of the process natural products are being converted, either partially or wholly, from their natural state to a condition to be used as such clothing or wearing apparel.

3. The mining or production of any substance or material in common use as a fuel either for domestic, manufacturing or transportation purposes.

4. The transportation of all food products and articles of substances entering into wearing apparel or fuel from the place where produced to the place of manufacture or consumption.

III. That the Court shall have its office at the capital of the state and shall keep a record of all its proceedings, which shall be a public record and subject to inspection the same as other public records of the state.

IV. The Court was granted power to adopt all reasonable and proper rules and regulations to govern the proceedings, to serve processes, to administer oaths and to regulate the mode and manner of all investigations, inspections and hearings. In taking testimony it must adhere to the rules of the evidence recognized by the Supreme Court of the state of Kansas.

V. In case of controversy arising between employers and workers, engaged in industries over which the court has jurisdiction, if it shall appear to the Court of Industrial Relations that the controversy may endanger the continuity of efficiency of service of any of said industries, full authority and jurisdiction is granted the Court, upon its own initiative to investigate the controversy and make such temporary findings as may be necessary to preserve and protect the status of the parties, property and public interests involved pending a full investigation of the controversy.

It is also made the duty of the Court, upon complaint of either party to such controversy or upon complaint of any ten citizens taxpayers of the community or upon complaint of the Attorney-General of the state of Kansas, if it shall be made to appear that the parties are unable to agree and that the controversy may endanger the continuity and efficiency of the industry, endanger the public peace or threaten the public health, to investigate and determine the controversy.

In all cases the Court has authority to order any changes that it deems necessary in matters of working and living conditions, hours of labor, rules and practices and a reasonable minimum wage, or standard of wages. The underlying principle governing all decisions of the court is that wages shall be just and reasonable; that workmen have the right to healthful and moral conditions in which to work; that conditions shall be such as to enable the industry to continue with reasonable efficiency and to allow a fair return on the capital invested.

The right of collective bargaining is also recognized, provided the members of all associations desiring such bargaining, shall appoint in writing some officer or officers to conduct the negotiations.

The right of any individual to quit his employment at any time is fully recognized, but conspiracy of two or more workmen or of labor organizations to quit their employment, or for the purpose of inducing the others to quit their employment for the purpose of hindering or interfering with the industry is unlawful. "Picketing," the use of force, threats or any other measures for the purpose of intimidating or pre-

venting persons from accepting employment are also unlawful.

Court of International Justice. The League of Nations Covenant provided for the formation of a permanent court of international justice, and the Council of the League, at its meeting in London, February 1, 1920, invited a number of the most noted jurists of the leading countries to draft a plan for such a court. The United States was represented by Mr. Elihu Root. The scheme presented was approved by the League of Nations at its first meeting, with the exception of the clause conferring upon the court authority to enforce its decisions. The question of recognizing the compulsory jurisdiction was left to the choice of the nations.

This court does not take the place of the International Court of Arbitration provided by the Hague Tribunal (which see). The court of arbitration settles cases of a diplomatic nature and the court of justice settles cases referred to it in which points of international law are involved.

The court consists of fifteen members—eleven judges and four deputy judges. The judges are elected by the Assembly regardless of their nationality and the Council of the League of Nations from a list of persons nominated by national groups in the Court of Arbitration. All nominees are eminently qualified jurists. The selection represents the main forms of civilization and the principal legal systems of the world.

The court holds one session a year, and unless otherwise provided, the full court sits. If the eleven judges cannot be present, the deputy judges are called upon to sit to make up the number. If eleven judges are not available, nine judges shall constitute a quorum.

The court is open to all nations, whether they are members of the League or not. And Article XVII of the Covenant states that, "in the event of a dispute between members of the League and a State which is not a member," the State not a member shall be invited to "accept the obligations of membership in the League for the purpose of such dispute." Should such a State refuse, and resort to war against a member of the League, it comes under Article XVI, and is deemed to have committed an act of war against all members of the League.

The following judges were chosen at the second meeting of the League: John Bassett Moore, of the United States; Viscount Robert Finlay, of Great Britain; Dr. Yorozu Oda, of Japan; Dr. Andre Weiss, of France; Commendatore Dionisio Anzilotti, of Italy; Dr. Ruy Barbosa, of Brazil; Dr. B. T. C. Loder, of Holland; Dr. Antonio S. de Bustamente, of Cuba; Judge L. Byholm, of Denmark; Dr. Max Huber, of Switzerland; and Rafael Altamira y Creavea, of Spain. The court is required to hold one session a year.

Courts of Law, United States. Much confusion exists on this subject because certain state and federal courts are not designated uniformly. This confusion can be avoided largely by remembering that there are two great divisions of courts, the federal or national courts, with a jurisdiction somewhat narrowly limited by the Constitution of the United States; and the state courts before which comes the great body of business touching everyday life. These divisions will be treated separately.

Federal Courts. The Constitution provided simply for a Supreme Court and such inferior courts as Congress may from time to time establish. The Supreme Court was organized under President Washington; it consists of a Chief Justice and eight Associate Justices. The most important business brought before it touches questions of constitutional law appealed from lower federal courts or from state courts. Six judges must be present at each trial and a majority is necessary for a decision.

Directly below the Supreme Court are the Circuit Courts of Appeals; the United States is divided into nine great circuits, in each of which is a court. They were created in 1891 to relieve the overburdened Supreme Court. The act provided that a Justice of the Supreme Court be assigned to each circuit, that an additional circuit judge be appointed for each circuit, and that the judges of the United

States District Courts within that circuit be competent to sit as judges of the Circuit Court of Appeals. A Circuit Court of Appeals may consist of any three of these judges, two of which form a quorum, though of course no judge before whom a case has been tried in a District or Circuit Court may sit on trial or hearing of that case in the Circuit Court of Appeals. All cases appealed from the lower federal courts not involving a question of constitutionality go to this court; reserved for the Supreme Court are those only which involve a question as to whether or not a law is in harmony with the Constitution. It is rather easy, however, to raise this question, so the new court has not been able to fufill the expectation that it would relieve the great judicial body at Washington.

Formerly there was a Circuit Court, immediately below the Circuit Court of Appeals, but in 1911 this court was abolished, and now the District Court ranks next to the Circuit Court of Appeals. In 1920 there were 103 District Courts in the United States, including Alaska, Hawaii and Porto Rico. Each District has one judge. The jurisdiction of the district court extends to criminal prosecutions for violation of United States Laws; to cases connected with postal and revenue laws, and to cases in bankruptcy and admiralty affairs. Practically the District Courts have jurisdiction in all cases assigned by the Constitution (Article III) to the Federal Judiciary, except those cases in which the Supreme Court has original jurisdiction. All cases to which the Federal Laws directly apply, except those over which the Supreme Court has original jurisdiction, are begun in the District Court. Appeals from the District Court are taken to the Circuit Court of Appeals, unless the constitutionality of the law is questioned; such cases are appealed.

The Federal Courts also have jurisdiction over all cases affecting ambassadors, other public ministers and consuls, between two or more states; between a state and citizens of another state; between citizens of different states; between a state or its citizens and a foreign state or its citizens.

The other Federal Courts are: The Court of Claims having jurisdiction over all money claims of individuals against the United States; the Court of Appeals of the District of Columbia which hears appeals from the Supreme Court of the District of Columbia; the Supreme Court of the District of Columbia with jurisdiction similar to that of the other United States District Courts and Territorial Courts.

All United States Courts are overworked, and most of them are far behind on their calendars, so that months and even years may pass before a decision is reached in certain classes of cases.

STATE COURTS. Almost every man comes in contact sometime with the state courts, if it be only to serve on a jury or act as a witness in a lawsuit. The names by which the same courts are known in different states often vary, but in all the states there is practically the same progressive series of courts.

The courts of justices of the peace stand at the bottom of the scale. In them are tried civil cases involving small amounts, and petty offenses. In great cities such civil cases are usually tried in municipal civil courts, and the criminal actions in the police courts.

Most states have county courts, sometimes styled district courts or courts of common pleas. In them are tried suits involving considerable sums and cases appealed from justices of the peace. They have also extensive criminal jurisdiction. In many states there is a superior, circuit or district court, immediately above the county court, which has wide jurisdiction in civil and criminal matters. The judges for such a court are generally chosen for districts larger than the county, holding terms of court in each county of their district or circuit. Every state has a court of last appeal, known variously as supreme court, court of appeals, court of errors and appeals, or supreme judicial court, which deals usually with appeals on questions of law, not of fact. (Some cases may be taken direct to the U. S. Supreme Court.)

Besides these four, there are sometimes special tribunals for special purposes, such as probate courts, called also surrogates' and orphans' courts for trials involving the estates of deceased persons; juvenile courts for children who have committed offenses; and courts of claims for hearing claims against the state. See JURY; HABEAS CORPUS; MANDAMUS.

Cousin, koo-zăn′, **Victor** (1792-1867), an eminent French educator and philosopher. Cousin was the son of a Parisian watchmaker in the famous Quartier St. Antoine. He saw stirring times in the days of his youth. When of suitable age he attended the Lycée, or Latin school, in his part of the city. Later he entered the normal school of Paris, in which he became an instructor in Greek. During the intolerant days of Louis XVIII the normal school was abolished, and Cousin, who had acquired quite a reputation as a rising philosopher, was thrown out of his position. Losing no time on this account he took up his studies in earnest; traveled, mainly in Germany, and published several treatises. After seven years, a change in government restored him to his work, and he became professor of philosophy in the University of Paris. His lectures were brilliant and earnest and gave a new impetus to the subject.

In 1830 Cousin's colleague, Guizot, became the head of a new ministry, and he was invited to leave his lecture room for a membership in the council of education. Thirty years before, the French Revolution had promised France adequate public schools, and it now became Cousin's privilege to draft a bill establishing such a system, and to plan and work for its development. Abstract philosophy and the pleasures of scholarship were laid aside. Cousin traveled again extensively, investigating the systems of schools in Europe. Two reports, one on the *State of Primary Education in Several of the States of Germany, Particularly Prussia,* another on *Public Instruction in Holland,* attracted world wide attention. They were translated into English. Reprints were distributed at state expense in Massachusetts and New Jersey. Without doubt these reports were the beginning of a popular belief in the superiority of German schools.

Cousin was the recipient of many honors and distinctions, but he was kind enough to say, "None has touched me more than the title of Foreign Member of the American Institute for Education." Victor Cousin is now most frequently quoted as a philosopher; but his claim to renown will rest finally on the service he was happily enabled to render the cause of public education.

Covenanters, adherents of the early church of Scotland. When James VI, the Presbyterian king of Scotland, became James I of England, he also became the head of the Episcopal church. His son, Charles I, who was afterward beheaded, showed a disposition to substitute the church service and prayer book of England for the Presbyterian forms of worship in Scotland. The Presbyterians bound themselves by a covenant in 1638 to resist. In 1643 the Scottish leaders formed a solemn league and covenant with the Parliament of England, then largely Presbyterian, to oppose Episcopacy throughout England and to set up churches on the Presbyterian model. After the restoration of Charles II to the throne of England, he undertook to root out Presbyterianism in Scotland. A period of persecution followed. The Covenanters, as the adherents of the Presbyterian faith were called, were in hard straits. They were obliged to hold their meetings in unfrequented places surrounded by bogs, among the mountains, in caves and elsewhere. Oftentimes their meetings were surprised. Several hundred persons were put to death by English troopers. In the eye of English authorities, their faith came to be regarded as treasonable, for the Covenanters were all sworn opponents of the Stuart family. Persecutions ceased with the accession of William and Mary in 1688. The Presbyterians again resumed services in their accustomed places of worship. In the meantime many families had migrated to the Carolinas, where their descendants gave a good account of themselves in the American Revolution, as may be seen in histories of that famous contest.

The following inscription from the kirkyard of Old Cathcart, near Glasgow, is one of many hundreds of similar import:

THIS*IS*THE*STONE*TOMB*OF*ROB
ERT*THOME*THOMAS*COOKE*AND
JOHN*URIF*MARTYRS*FOR*OUNNG
THE*COVENANTD*UORK*OF*RE
FORMATION*THE*11 OF*MAY*1685.
THE*BLOODY*MURDERS*OF*THESE*MEN
UERE*MAGOR*BALFOUR*AND*CAPTAIN*METLA
AND*UITH*THEM*OTHERS*UERE*NOT*FREE
CAUSED*THEM*TO*SEARCH*IN*PALMADIE
AS*SOON*AS*THEY*HAD*THEM*OUT*FOUND
THIEY*MURTHERED*THEM*WITH*SHOTS*OF*GUNS
SCARCE*TIME*DID*THEY*TO*THEM*ALLOU
BEFOR*THER*MAKER*THER*KNIES*TO*BOU
MANY*LIKE*IN*THIS*LAND*HAVE*BEEN
WHOS*BLOOD*FOR*WINGANCE*CRYS*TO*HEAVN
THIS*CRUELL*WICKEDNESS*YOW*SEE
WAS*DON*IN*LON*OF*PALMADIE
THIS*MAY*A*STANDING*WITNESS*BE
TUIXT*PRESBYTRIE*AND*PRELACIE.

The graves of the Covenanters are to be found in the old churchyards all over southern Scotland. They are guarded with special reverence. In accordance with the custom of the times, the gravestones are large slabs, the size of a grave. They lie flat on the ground, sometimes so close together as to form a sort of pavement. When the letters are worn shallow by frequent tramping, they are recut. In *Old Mortality,* Walter Scott describes an odd character whose business it was to recut inscriptions.

Covent Garden, a garden once belonging to the abbot of Westminster. The original spelling was Convent. The old garden was cultivated by monks. It was surrounded by a wall, and extended from the Strand to the open country. In 1552 the land, some seven acres, passed into the hands of the Bedford family as a gift from the king. This gift was accompanied by a permit to maintain a market, with which none should be allowed to compete. Market gardeners sold their vegetables here. In 1831 the Duke of Bedford erected vast market buildings, in which the housewife may do her shopping. He derives a revenue of $75,000,000 a year from rentals. London citizens complain of this monopoly and point to the fact that the city of Manchester derives a revenue of $70,000,000 from a similar market owned by the public. The Covent Garden Market is now one of the sights of London. It is the greatest fruit, flower, and vegetable market in the world. The utmost neatness is required. From eight to ten in the morning the show of fruit and the fragrance and brilliancy of the flowers convert the market into a paradise. The Garden gives its name to the locality, and to a number of buildings in the vicinity, including Covent Garden Theater, open only to money and full dress.

Coventry, a city in Warwickshire. It is an old English town. A Benedictine monastery was established in 1044 by the Lady Godiva. As early as 1392 mystery and morality plays were presented by the Gray Friars. A series of forty-two of these plays, covering Bible history from the creation of the Garden of Eden to the Last Supper and the day of resurrection, has been preserved, and is known as the *Coventry Plays.* They are of first importance to the student who is endeavoring to understand the early English drama. The city was fortified. It is stated that at one time Coventry had a military garrison of such repute that a woman seen conversing with a red coat was at once reckoned an outcast. The citizens would hold no intercourse with the soldiers, not even with the officers. Very naturally a young officer, likely enough of good family, was averse to being "sent to Coventry," where he would be debarred from desirable associations. Whatever its exact origin the phrase still lingers. When army men cut the acquaintance of a fellow officer they are said "to send him to Coventry," and when one is excluded from polite society he is said to be "sent to Coventry." The Coventry of today is a modern city. The old walls have disappeared. The cathedral fell in the reign of Henry VIII. According to Chambers the present parish church is the largest in England. Few old buildings remain. Coventry is a manufacturing and market town of some note. The city was at one time famous for the manufacture of ribbons. It is now known for bicycles, clocks, and watches. There are railway connections and an extensive canal system. The population in 1921 was 106,349.

Coverdale, Miles (1488-1568), an English bishop and reformer. He was educated at Cambridge and was ordained a priest at Norwich in 1514. He was led to embrace the reformed doctrines. In 1535 he published a translation of the Scriptures, dedicated to Henry VIII. This was the first printed version of the entire Bible. He went to France and was engaged in superintending the printing of a revised English version, when interrupted by the ecclesiastical authorities, who seized and destroyed the greater part of the impressions already completed. The types and presses were taken to England and enabled Cranmer's Bible, called the Great Bible, to be printed. Coverdale was made bishop of Exeter during the reign of Edward VI; but, on the accession of Mary, he was ejected and thrown into prison. After two years he was liberated and went abroad, where he assisted in preparing the Geneva Bible. His writings are numerous.

Coverley, Sir Roger de, the chief member of an imaginary club under whose direction the *Spectator* was professedly edited. The character was originally sketched by Steele, but developed by Addison. Sir Roger is represented as a country gentleman, simple minded but warm hearted, amiable, and eccentric. See ADDISON; SPECTATOR.

> Sir Roger de Coverley is not to be described by any pen but that of Addison. He exhibits, joined to a perfect simplicity, the qualities of a just, honest, useful man, and delightful companion. . . . Addison dwelt with tenderness on every detail regarding him, and finally described Sir Roger's death to prevent any less reverential pen from trifling with his hero.—Tuckerman.

Covington, the county seat of Kenton County, Kentucky. It is situated on the Ohio River opposite Cincinnati, with which city it is connected by a fine suspension bridge 2,250 feet long. Many Cincinnati business men have made their homes in Covington, which has thus gained note as a city of fine residences. It has also a public library, a United States government building, and a Roman Catholic cathedral with which are connected a foundling asylum, a hospital, an academy, a priory, and a convent. Covington is the center for farming and livestock interests of north central Kentucky. It is served by two railroads and has steamboat connections with all point on the Ohio River. Its industries include pork-packing and the manufacture of flour, tobacco, distilled liquors, glass, leather, tinware, stoves, furniture, bricks, and pottery. In 1920 the population was 57,121.

Cow, the adult female of the ox kind. The term has been extended to include many other, chiefly large animals, as the cow moose, cow whale, etc. A female calf is called a heifer. For some notion of the economic importance of the cow, see articles on BUTTER and CHEESE.

Our best dairy cows are obtained from particular districts of Europe. The brown Swiss, a middle-sized, small-boned, gentle cow with a black nose, tongue, hoofs, and tail, comes from Switzerland. Holstein cows are large black and white animals with an enormous yield of milk of not inferior quality. Individual cows of this breed are credited with as high as 20,000 pounds of milk in a single year. The Ayrshire breed of red and white cows originated in Scotland. The Devon cow from South England is almost entirely red. The Jerseys and the Guernseys are from the Channel Islands between England and France. Durhams are a large red and white breed from England, celebrated more for beef; yet a Durham, or short horned cow is reported from Wisconsin as yielding 584 pounds of butter in a year. Her owner states that it cost him $39.60 for feed, and that the total value of her production was $131.83. The cow is a wonderful producer of food. The Nebraska experiment station claims a cow that produces 17,000 pounds of milk yielding 650 pounds of butter in a year. The Princess Carlotta, a Holstein cow owned by the dairy department of the University of Missouri, in one year produced 18,405 pounds of milk,—more human food in her milk than is contained in the complete carcasses of four steers weighing 1,250 pounds each. Successful dairymen consider that it costs no more to keep a productive animal than a poor one.

The importance of the cow in modern civilization may be seen by the following statistics taken from the last United States census. It should be remembered that the United States is only one of a number of countries in which cows are kept for dairying purposes.

Total number of cows in the United States	20,625,432
Average yield of milk in gallons	282
Annual yield of milk in gallons	5,813,699,474
Annual production of cheese in pounds	9,405,864
Annual production of butter in pounds	994,650,610

To this enormous production must be added the cow's share of beef and leather.

The number of milch cows is constantly on the increase. The United States Department of Agriculture gave the following estimate of the number of milch cows in the country, January 1, 1920:

State	Number
Vermont	278,000
New York	1,493,000
Pennsylvania	970,000
Virginia	437,000
West Virginia	250,000
North Carolina	328,000
South Carolina	211,000
Georgia	461,000
Ohio	1,061,000
Indiana	724,000
Illinois	1,060,000
Michigan	873,000
Wisconsin	1,846,000
Minnesota	1,395,000
Iowa	1,353,000
Missouri	919,000
North Dakota	464,000
South Dakota	561,000
Nebraska	601,000
Kansas	935,000
Kentucky	457,000
Tennessee	384,000
Alabama	502,000
Mississippi	571,000
Louisiana	378,000
Texas	1,138,000
Oklahoma	550,000
Arkansas	452,000
Washington	228,000
Oregon	224,000
California	571,000
Other states	1,800,000
	23,747,000

From 1910 to 1918 the average price for milch cows increased from $32 to $70.50. In 1921 it was $85.13.

Cowbird, a member of the blackbird family. The male has a coffee-colored head, neck and breast of brown, with a glossy black body, lustrous with bluish and greenish reflections. The female is clad in a dark, brownish gray suit. Range, from Texas to Manitoba and eastward. Small flocks of a dozen or fewer individuals follow cattle about the pasture and haunt the milking yard, apparently for the insects they can catch. The cowbird builds no nest. The female leaves the flock, sneaks about, and drops her egg in the nest of a sparrow or other small bird. She leaves it to be hatched and her young to be reared by the unsuspecting dupe. The young cowbird is large, greedy, and selfish, frequently shouldering the rightful occupants out of the nest. When well grown it leaves its drudging foster mother and joins those of its own kind. For the characteristics of an English bird of another family, but with similar habits, see CUCKOO.

Cowley, Abraham (1618-1667), an English poet. At the age of fifteen, while attending Westminster School, he published his first volume of poems, *Poetical Blossoms.* He was elected a scholar of Trinity College, Cambridge, where he attained literary distinction. He was ejected from Cambridge as a royalist, and removed to Oxford, where he published a satirical poem entitled *The Puritan and the Papist.* Still identified with the Royalists, he followed Queen Henrietta to France in 1646, where he remained until 1656. He returned to England and settled at Chertsey. Among his poetical writings are *Miscellanies, The Mistress, Pindarique Odes,* and an unfinished epic on King David. In prose he wrote *Proposition for the Advancement of Experimental Philosophy, Discourse by Way of Vision concerning the Government of Oliver Cromwell,* and others. As a poet he was extremely popular in his day, but fifty years after his death his poetry was already a thing of the past.

QUOTATIONS.

Hope, of all ills that men endure,
The only cheap and universal cure.

Nothing is there to come, and nothing past,
But an eternal now does always last.

God the first garden made, and the first city Cain.

Thus would I double my life's fading space;
For he that runs it well, runs twice his race.

I would not fear nor wish my fate,
But boldly say each night,—
To-morrow let my sun his beams display,
Or in clouds hide them; I have lived to-day.

Abraham Cowley, who at one time was ranked amongst the greatest of our poets, is now read by few. He is a curious relic of that school of poetry which rejected simplicity as beneath the dignity of verse, and aimed at expressing the most extravagant thoughts in the most hyperbolical language. Wit and learning he undoubtedly had; but in his poetry his learning becomes pedantry and his wit affectation. His prose writings, unlike his poetry, are elegant without exaggeration.—Knight.

Cowley was an author by profession, the oldest of those who in England deserve the name.—Taine.

Cowpea, a summer annual, in appearance resembling the field bean. The cowpea is a native of India and possibly of China. In the East it has been under cultivation for the last two thousand years. In the cotton belt of the United States, the cowpea takes the place of the red clover of more northern and cooler regions. The leaf of the cowpea is tri-foliate. The flowers vary from purple to white. The pods are from five to ten inches in length and are well filled with kidney-shaped or roundish peas. There are numerous varieties. Several, known as crowders, are so called because the beans are crowded together so closely as to have flattened ends. So far as frost is concerned, the cowpea is very tender. Along the Gulf seed is sown in April. In Delaware it is sown as late as July. Like clover and alfalfa, the roots of the cowpea bear tubercles that store up nitrogen. The raising of a crop of cowpeas fertilizes the soil. The crop is cured like a crop of clover or alfalfa. Stacks of cowpea hay have little power to turn rain. The crop, therefore, requires barns or other protection.

Cowpens, a battlefield near the northern border of South Carolina, not far from King's Mountain. It was covered with timber and undergrowth. General Morgan, with 900 men, January 17, 1781, took position on two knolls, with his rear on the Broad River so that his militia could not run away. Tarleton, the famous cavalry commander of Cornwallis, attacked with 1,100 men. The American militia deployed in front, used their rifles with good effect, and drew away into shelter. Tarleton, thinking the day was his, sounded a charge straight for the river. He was met by a central force of American riflemen, good for a squirrel's head at a hundred paces. The militia under Andrew Pickens reformed in shelter of a hill and fell on one flank; the American cavalry under William Washington fell on the other. Altogether they made short work of the British. Two hundred and seventy were killed and wounded; 600 were taken prisoners; and over 1,000 muskets were captured. Only twelve Americans were killed. Tarleton fled with a handful of followers. The defeat, coming so soon after King's Mountain, was a severe blow to Cornwallis, and encouraged the American patriots greatly. See CORNWALLIS.

Cowper, William, pronounced cooper (1731-1800), an English poet. His father was court chaplain. William was trained for the law. He received a government clerkship, and lost his mind while studying to take examinations. He sank into a sort of religious mania from which, however, he emerged to write a number of elevated, graceful poems. He died in utter madness and despair. His more mature poems are: *Moral Satires,* written in imitation of Pope; *The Task,* in praise of a quiet, secluded country life, a poem much admired by Burns; a *Translation of Homer; The Loss of the Royal George,* a warship that went down in the English Channel with terrible loss of life; *To Mary,* in honor of a lady friend; *Alexander Selkirk,* opening with the well known lines,

I am monarch of all I survey,
My right there is none to dispute;

and lastly, *John Gilpin's Ride,* betraying an unexpected but none the less delightful vein of humor and fun in the poet's makeup.

SAYINGS.

God made the country, man made the town.

Not much the worse for wear.

How much a dunce that has been sent to roam,
Excels a dunce that has been kept at home.

Absence of occupation is not rest,
A mind quite vacant is a mind distress'd.

An idler is a watch that wants both hands,
As useless if it goes as if it stands.

His wit invites you by his looks to come,
But when you knock, it never is at home.

Oh for a lodge in some vast wilderness.

Variety's the very spice of life.

She that asks
Her dear five hundred friends.

Knowledge is proud that he has learn'd so much;
Wisdom is humble that he knows no more.

SAID OF COWPER.

Cowper was the most popular poet of his generation, and the best of English letter writers.—Southey.

Poor charming soul, perishing like a frail flower transplanted from a warm land to the snow: the world's temperature was too rough for it; and the moral law, which should have supported it, tore it with its thorns.—Taine.

Cowper's style is natural and firm, though sometimes dull. He helped to rid poetry of its artificiality.—Emery.

Cowry, a small shell of eastern waters, formerly in demand by the natives of western Africa for ornaments. Strings of cowry were used to purchase ivory or any other commodity the negroes had to sell. British merchants used to collect immense quantities of money cowry in the East Indies for purposes of barter. Three hundred tons a year were brought to Liverpool during the middle of the nineteenth century. Cowry shells still have value among some tribes. The money cowry is about an inch long and is almost as wide. Roughly speaking, it may be likened to a small egg slit the length of one side with the edges tucked in. It has a yellow or white shell, not especially beautiful. When the English took possession of India, cowry shells were in regular use as money, at the rate of about one-sixth of a cent per dozen. See WAMPUM; BARTER.

Cowslip, a beautiful flowering plant of Europe. It belongs to the primula family. A number of scapes, a hand's breadth or more in height, spring from a rosette of soft, oval leaves. Each bears a one-sided umbel of fragrant yellow flowers. As is the case with the robin, American settlers have brought the name to America. It has been given to plants that have no relationship to the English cowslip. Among the flowers falsely called cowslips are the marsh marigold of early spring and the Virginian lungwort or bluebell. The shooting star, with its blue pendulous flowers and recurved petals, is related to the cowslip of Europe. It may be called the American cowslip. See CYCLAMEN; PRIMROSE.

Cox, Palmer (1840-), an American artist and author, creator of the "Brownies." He was born at Granby, Quebec, and educated at the Granby Academy. When but twenty-three years old he went West, living in San Francisco until 1875, where he wrote and sketched for periodicals. He removed then to New York, where he published the inimitable illustrated "Brownie" verses, among them *The Brownie Stories, The Brownies at Home, The Brownies in Fairyland, The Brownies through the Union,* etc. They appeared first in popular periodicals.

Coxey, Jacob Selcher (1854-), the leader of "Coxey's Army." Mr. Coxey was born in Pennsylvania. He worked in a rolling mill, became the owner of a sandstone quarry at Massillon, Ohio, where he lived and became a prosperous man, accumulating much money. Originally an Episcopalian, he became interested in theosophy. He took an interest in public affairs. In 1892 he urged Congress to issue legal tender treasury notes to the value of $500,000,000 to be expended in building good roads. In 1894 he arranged with Mr. Carl Browne, whom he had met at a silver convention, to lead an army of the unemployed to Washington to present a petition to Congress on the steps of the Capitol, and to camp there until favorable action had been taken. Senator Peffer of Kansas was to introduce the desired measure—a good roads bill which should give unemployed men work. Payment was to be made in legal tender paper currency, to be had for the cost of printing. The army was to enlist 100,000 men. As a matter of fact it never exceeded 500 men. "The Commonweal of Christ," as the army was called, started from Massillon

Easter morning, March 24, 1894. It was a motley, but orderly crowd. Some were tramps; some were men out of employment. A negro carrying the flag of the United States led the way. Carl Browne, clad in fringed buckskin and wearing a cowboy's broad brimmed sombrero, rode a gray mare. Next marched the trumpeter, "Windy Oliver," followed by "Cyclone" Kirkland of Pittsburg and seven musicians. General Coxey himself, the owner of a fine Kentucky farm, rode in a buggy drawn by a pair of bay mares. Mrs. Coxey, her sister, a daughter, and an infant son named "Legal Tender," followed in a carriage. Behind these strode a second negro bearing a banner with a portrait of Christ and a legend, "Death to interest-bearing bonds." About one hundred men formed the army proper. Ninety-nine thousand nine hundred more were expected to join the army on the way. Three wagons carried a circus tent and supplies. Forty-three newspaper reporters accompanied the procession. The army encountered a snowstorm in crossing the Blue Ridge Mountains. A few stragglers were arrested as vagrants and quarrels arose; but, on the whole, good order prevailed. Supplies were solicited or were tendered freely. General Coxey boasted that "not a chicken was stolen." The progress of the army was heralded widely by the reporters. Congress was nervous. The risings of the English, Wat the Tyler, and Jack Cade were brought to mind. The army reached Washington late in April. On the first of May the "Commonweal of Christ" marched solemnly to the Capitol steps amid an immense concourse of spectators. When General Coxey dismounted he and Mr. Carl Browne and a Mr. Jones were arrested for "trespassing on the grass." The army went back to camp. The leaders were held for twenty days. The army disbanded by degrees. Other armies were organized, particularly in Chicago; but, with the coming of improved financial conditions, the movement came to an end. In 1895 Coxey was the People's Party candidate for governor of Ohio, and polled 52,000 votes. His party, however, gradually fell to pieces.

Coyote, kī′ō-te, or **Prairie Wolf**, a small, meager, yellowish wolf of the plains. It forms a burrow or den in the ground like the fox. Five to seven puppies come in May. Its natural food consists of sage hens, eggs, small birds, jackrabbits, and any other animal food it can find. It is a serious pest to the herdsmen, assailing calves and lambs, and even sheep in its hunger. It is rather wary about taking poison, is too swift for hounds, and keeps out of gunshot. Its wail at night often terrifies intended victims. Mark Twain's description cannot be improved:

> The coyote of the farther deserts is a long, slim, sick, and sorry-looking skeleton with a gray wolf skin stretched over it, a tolerably bushy tail that forever sags down with a despairing expression of forsakenness and misery, a furtive and evil eye, and a long, sharp face. He is always poor, out of luck, and friendless. He is so spiritless and cowardly that, even while his exposed teeth are pretending a threat, the rest of his face is apologizing for it. And he is so homely! So scrawny, and ribby, and coarse-haired, and pitiful! When he sees you he lifts his lip and lets a flash of his teeth out, and then he stops and takes a deliberate survey of you again; and, finally, the gray of his gliding body blends with the gray of the sage-brush, and he disappears.

The Coyote was so proud that he determined to have a dance through heaven itself, having chosen as his partner a certain star that used to pass quite close by a mountain where he spent a good deal of his time. So he called out to the star to take him by the paw and they would go round the world together for a night; but the star only laughed, and winked in an excessively provoking way from time to time. The Coyote persisted angrily in his demand, and barked and barked at the star all round heaven, till the twinkling thing grew tired of his noise and told him to be quiet and he should be taken next night. Next night the star came quite up close to the cliff where the Coyote stood, who leaping was able to catch on. Away they danced together through the blue heavens. Fine sport it was for a while; but oh, it grew bitter cold up there for a Coyote of the earth, and it was an awful sight to look down to where the broad Klamath lay like a slack bow-string and the Cahroc villages like arrow-heads. Woe for the Coyote! his numb paws have slipped their hold on his bright companion; dark is the partner that leads the dance now, and the name of him is Death. Ten long snows the Coyote is in falling, and when he strikes the earth he is smashed as flat as a willow-mat.—Coyotes must not dance with stars.—Robinson, *Legend of California Indians.*

Crab, a popular name used to designate a large number of crustaceans—shellfish. The crabs are to be distinguished from lobsters, crayfish, prawns, and shrimps by shortness of body. The abdomen or so-called tail of the body is reduced in size and is folded under the thorax, giving the body a broad, stout appearance. Crabs have stalk eyes and ten jointed legs. The front pair of legs is developed into large pincer-like claws. In the case of marine crabs one pair of legs takes the form of fin-like swimmerets. Crabs can scrabble over the sand in any direction, but they prefer to step sidewise. They have stout bodies covered with a firm shell, and look not unlike spiders in armor. There are many species not closely related. There are marine crabs and land crabs, swimming crabs and crawling crabs. There are large crabs and small crabs,—giant crabs, with arms so long that they open eighteen feet at the stretch, and peacrabs so small that they are able to live with the oyster in its shell. Some crabs live near the salt water; others live in it. Some species live on vegetable matter; other species, on snails, minnows, small shell-fish, and carrion. Anything fleshy, dead or alive, they crowd into the stomach with their pincers. The stomach is furnished with horny projections. It contracts and works like the gizzard of a chicken to crush and grind food.

Crabs are great scavengers. At some seaside resorts they render service in keeping the shore clean. Shoals of them come up at night and act as scavengers. Crabs are of many colors, blue, red, purple, and green. Some are phosphorescent. The blue crab is esteemed for food, and may be found in the markets of seaside cities. It is taken by letting a bit of meat down into the water by a string. The crab seizes the meat with its pincers and holds on tenaciously until it is drawn to the surface, when it is an easy matter to take it with a landing net before it lets go.

The sand crab has the color of sand, and hastens to bury itself to the eyes if a footstep approaches. Where a seashore was alive with them a moment before, nothcan be seen by the stranger, though many a pair of eyes are fixed upon him. The fiddler crab—not a true crab—fairly swarms along the shallow ditches of the Gulf States. It gets its name from one abnormally large pincer and one abortive one, suggesting a fiddle and a bow. The hermit crab, another distant relative, thrusts its soft tail into some empty shell for protection. The larger it grows the larger the shell it needs, a truth so impressed on the hermit that it squabbles with its neighbors constantly. A large hermit has been known to force a dozen other hermits to allow him to try on their shells, only to go back to his own as the best after all.

The land crabs of the West Indies hide in holes in the daytime. At night they come out and pinch off the young shoots of the sugar-cane. They are so numerous that planters regard them as a serious pest.

The largest crab known is the spider crab of Japan. Its scuttles about on the floor of the ocean 2,000 feet under water. It is said to have a spread of eighteen feet from claw to claw.

See CRAYFISH.

Crabapple, a close relative of the apple. There are not less than seventy species. The crabapple has handsome leaves and beautiful fragrant flowers. The hawthorn of the English poets—the pride of English hedgerows—is a crabapple. The "crabs" or crabapples of our orchards are merely small, hardy kinds of apples adapted to northern latitudes, and brought, several of them at least, from Siberia. It would save confusion if we could use the English word hawthorn for our small fruited trees that are not apples. See APPLE; HAWTHORN.

Crabbe, krab, **George** (1754-1832), an English poet. He was born at Aldborough, Suffolk. He was educated as a surgeon, but, failing to get a living in his native village, he went up to London. He was befriended by Edmund Burke, and finally turned clergyman. His later years were spent peacefully in the discharge of the duties of his parish at Trowbridge, Wiltshire. He was universally esteemed. His chief writings are *The Village, The Parish Register, The Borough,* and *Tales of the Hall.* Crabbe uses the two-rhymed

couplet in the greater number of his poems. His style lacks polish and musical rhythm. It is, however, direct and unaffected, and not without dramatic qualities. He describes simple village life with truth and vigor, but shows the trials of the poor in harsher light than does Goldsmith in the *Deserted Village.*

QUOTATIONS.

Nor you, ye poor, of lettered scorn complain,
To you, the smoothest song is smooth in vain;
O'ercome by labour, and bowed down by time,
Feel you the barren flattery of a rhyme?
Can poets soothe you, when you pine for bread,
By winding myrtles round your ruin'd shed?
Can their light tales your weighty griefs o'er-
power,
Or glad with airy mirth the toilsome hour?
—*The Village.*

Books cannot always please, however good;
Minds are not ever craving for their food.

But 't was a maxim he had often tried,
That right was right, and there he would abide.

He tried the luxury of doing good.

SAID OF CRABBE.

A Pope in worsted stockings.—Smith.

Nature's sternest painter, yet the best.—Byron.

An admirable foil to the insincerity of the fashionable pastoral.—Courthope.

Cracow, krā′kō, an ancient Polish city. It is situated on the Vistula, at the head of navigation. It was the capital of Poland from 1320 to 1609. Even after the removal of the capital to Warsaw the kings were crowned here, just as the czar of Russia is crowned at Moscow. The cathedral, completed in 1359, is the burial place of the kings and the national heroes of the Polish people. The chapels are decorated with a number of fine monuments and notable works of sculpture, among others a Christ by Thorwaldsen. A silver shrine of St. Stanislaus, the patron saint of Poland, stands in the middle of the church. Other noted buildings are the Church of St. Mary, the Tuchhaus, or Cloth Hall, and the Museum. The University of Cracow, in which Copernicus was a student, was founded in 1364. At the dismemberment of Poland it fell gradually into decay, but was reorganized in 1817. It has a fine libary of 300,000 volumes. A monument of Kosciusko, 120 feet in height, stands on a hill near the city. Cracow is one of the five industrial centers of Poland, and has a population (1921) of 176,463. There are several fine educational institutions here, among them an Academy of Arts, an Academy of Mines, an Academy of Commerce and an Academy of Sciences, the latter being purely scientific and the highest institute of learning in Poland.

Near Cracow is a remarkable salt mine, an underground world, which has been in existence for a thousand years or more. Story after story has been excavated, each floor resting on salt pillars rising from the floor below it. A thousand men are employed, and men, women and children live here generation after generation. There are 65 miles of halls and galleries and over 22 miles of tramways. Bags and barrels of salt are piled in ricks, as in flour mills. A large chapel 100 feet high has been carved out of the salt, and there are statues, pillars, etc., all of glistening salt. See POLAND; KOSCIUSKO.

Craddock, Charles Egbert, the pen-name of Miss Mary Noailles Murfree, an American novelist. See MURFREE, MARY NOAILLES.

Cradle of Liberty. See FANEUIL HALL.

Craig, Sir James Henry (1748 - 1812), a British soldier and administrator, was born at Gibraltar. Entering the army in 1763, he was soon made a captain. He came to America; was wounded at Bunker Hill; was made a prisoner at Ticonderoga; and for several years he served in Nova Scotia. He was taken prisoner again in 1781, with Cornwallis at Yorktown. In 1791, Sir James was with the army in the Netherlands; and commanded a force that cooperated with the army of India in the capture of the Dutch colony in South Africa. From 1792 to 1802 he was with the army in India. He commanded troops in Italy and Sicily in 1805 and 1806. From 1807 to 1811 Sir James was governor of Lower Canada, now the Province of Quebec. His administration was marked by conflict with the French-Canadians, and in 1811 he resigned.

Craik, Dinah Maria Mulock (1826—1887), an English novelist and poet, commonly known as Miss Mulock. Her first

novel, *The Ogilvies,* was published in 1849. Her reputation was made, however, and is maintained by *John Halifax, Gentleman,* published in 1857. The story was circulated widely, and was translated into several languages. It is still popular. It is the touching, yet optimistic story of the simple life of a noble man. In all Mrs. Craik produced about twenty novels. *A Brave Lady, A Noble Life,* and *Olive* are among them. They are entertaining stories of wholesome tone. *Philip, My King,* and *Douglas, Tender and True,* are two of Mrs. Craik's poems which one desires to know. The latter has been set to music, and at one time had great popularity.

Crake. See RAIL.

Cranberry, a creeping member of the heath family, closely allied to the wintergreen and blueberry. The large or American cranberry trails its thread-like vines over wet peat bogs from North Carolina to Minnesota and northeastward. Its oval leaves are evergreen. The red, solid, cherry-like berries weight their slender pedicels over into the moss in so perfect an arch as to suggest the name crane—or cranberry. Ordinarily, cranberries are picked by hand, but before an expected frost, or other emergency, a picker like a scoop with a toothed bottom is used.

An ideal place for raising cranberries is a natural cranberry marsh, with a supply of water brought under control by a system of dams and ditches so that the vines may be flooded to save the flowers from a late frost in spring, or the young fruit from an early frost in autumn, and yet so under control that the marsh may be dried out for planting and picking. It is often desirable also to flood the plants against an attack from insects. When possible, a reservoir, like a mill pond, is constructed at the head of the marsh. A flooded marsh looks like a lake.

New Jersey, Cape Cod, and Wisconsin are the centers of cranberry production. Large tracts, once deemed worthless, now yield handsome incomes. Wild cranberries are shipped from Nova Scotia to Boston. The Cape Cod growers, who appear to have gone about the business most thoroughly, consider an expense of $200 to $400 an acre desirable. The swamp is first cleared of loose moss, sticks, and stumps, pared to an even surface; then covered with four inches of sand. Cuttings—bits of runners six inches long—are dropped in rows and pressed into the sand obliquely, so that about an inch is above the surface. The field is kept clear of weeds by hand picking. A marsh is expected to come into full bearing in three or four years.

Fifty bushels an acre is a fair yield, but the yield has been crowded up to 200 bushels. The cranberry crop of the United States for 1922 was 373,000 bushels. The area of cultivation is increasing. In 1922 New Jersey was reported to have an area of 10,000 acres planted to cranberries; Massachusetts, 13,000 and Wisconsin 2,000. Michigan, Maine and Connecticut follow in the order named.

Crane, a wading bird, classified near the heron. There are three North American species. The whooping crane is fifty inches in length. The plumage is white, save that the tip of the head and the sides of the neck are red, and the wing coverts black. It bred formerly from Illinois northward in unfrequented places, and wintered in the Gulf States. The whooping cranes migrated in single file with outstretched legs and neck. This species is practically extinct. The sandhill or brown crane of somewhat more southern range is a brownish gray bird, forty inches in length. It is noted for its antics in the breeding season, which have been likened aptly to an Indian war dance. In pioneer days the sandhill crane was so numerous and so familiar from Nebraska to Minnesota as to dispute the possession of the autumn stubble fields with the turkeys, but the most courageous "gobbler" was glad to retire before the powerful wing and sharp beak of the crane. There is also a third American species known as the little brown crane. It ranges from Alaska to Mexico. See HERON.

Whenever the days are cool and clear,
The sandhill crane goes walking
Across the field by the flashing weir,
Slowly, solemnly stalking.
The little frogs in the tules hear,
And jump for their lives if he comes near;

The fishes scuttle away in fear
When the sandhill crane goes walking.

The field folk know if he comes that way,
Slowly, solemnly stalking,
There is danger and death in the least delay,
When the sandhill crane goes walking.
The chipmunks stop in the midst of play;
The gophers hide in their holes away;
And "Hush, oh hush!" the field-mice say,
When the sandhill crane goes walking.
—Mrs. Mary Austin, in *St. Nicholas*.

Crane, a mechanism for raising heavy weights, transporting them limited distances and lowering them into desired positions. When used for lifting only, it is often called a derrick. The common form has a tall, upright shaft, set in a socket at the base with an oblique arm having a pulley in the upper and outer end. The weight may be raised by a crank on the shaft, which is then revolved till the object is over its desired position, when it may be lowered. It has a wide use in quarries, machine-shops, etc., the traveling crane, however, becoming more common in the latter. In this device the apparatus is mounted upon a track or trestle and is operated by an engine or motor. When it is iron that is to be lifted, powerful electromagnets are utilized.

Cranefly, a mosquito-like fly. It is often mistaken for an overgrown mosquito. Despite its long legs and wings, the cranefly is a stumbling walker and a poor flyer. Its natural home is in meadows. Its eggs are deposited in the ground. The second pair of wings is reduced to club-like appendages. Chambers states that the cranefly of England is called Peter-long-legs and that its larvae do serious damage to the roots of growing crops. Anyone who has watched the cranefly try to take care of six long legs at once can sympathize with the distressed owner.

My six long legs, all here, all there,
Oppress my bosom with despair.

Crane's Bill. See GERANIUM.

Cranes of Ibycus. See IBYCUS.

Cranford, a story by Mrs. Elizabeth Gaskell, published in 1853. This little book is a charming picture of quiet life in an English village. The people, particularly the women of this village, are described by Mary Smith, an observing young person from a nearby town. The women of Cranford scorn the "vulgarity of wealth," and practice "elegant economy." The story is full of a quaint and almost pathetic humor. Its popularity seems to increase, and it is already counted as a classic. In recent years two American women have produced books which may be compared with *Cranford* and not suffer by the comparison: *Old Chester Tales* by Mrs. Deland, and *Friendship Village* by Zona Gale. The following is from *Cranford:*

For keeping the trim gardens full of choice flowers without a weed to speck them; for frightening away little boys who look wistfully at the said flowers through the railings; for rushing out at the geese that occasionally venture into the gardens if the gates are left open; for deciding all questions of literature and politics without troubling themselves with unnecessary reasons or arguments; for obtaining clear and correct knowledge of everybody's affairs in the parish; for keeping their neat maid-servants in admirable order; for kindness (somewhat dictatorial) to the poor, and real tender good offices to each other whenever they are in distress,—the ladies of Cranford are quite sufficient.

"A man," as one of them observed to me once, "is *so* in the way in the house!"

See GASKELL, MRS. ELIZABETH.

Cranmer, Thomas (1489-1556), the first Protestant archbishop of Canterbury. A scion of an old Norman family. As a boy he was fond of hunting and riding. At Cambridge University Cranmer was skilled in the learned languages and in the Scriptures. In 1523 he was appointed a lecturer on theology. In 1528 Henry VIII desired a divorce from Catherine, the first of his six wives. Hearing that Cranmer had suggested that the case be tried, not before the Pope, but be "tried according to the word of God," Henry was so delighted that he asked, "Who is this Dr. Cranmer? Marry, I trow he hath the right sow by the ear." From this time on, Cranmer was Henry's right hand adviser. He was made a royal chaplain, and was sent on a mission to Rome and to the emperor. He married Henry to Anne Boleyn, and helped him get rid of both her and his fourth wife. Cranmer was active in furthering the English reformation and in pulling down the monasteries. An edition of the Scriptures is

known as Cranmer's Bible. Whenever the English people showed signs of going back to Catholicism, Cranmer stood for the new church. Under his influence pictures and images were ordered out of the churches. Communion was made to take the place of mass. An English book of common prayer took the place of the missal and breviary in use. When Henry's death and the short reign of Edward brought Mary, the Catholic daughter of Catherine to the throne, and Cranmer into the power of his old foes, it is small wonder that he was arrested and tried on charge of heresy. In hope of saving his life Cranmer signed six recantations, that is, took back all he had ever said or done against Catholicism; but his enemies could not be appeased so easily. March 21, 1556, Cranmer was haled from the gaol of Oxford, taken to church to hear his own funeral sermon, and was burned alive at the stake in front of one of the university buildings.

Crape, krāp, a fabric of silk, wool, or cotton whose surface is crinkled by small, irregular ridges or puckers. In making silk crape a hard twisted thread is used for the weft, and sometimes for both warp and weft. A group of wefts is woven into the warp; then another group the threads of which are twisted in the reverse direction. The threads are woven with more or less space between them; when removed from the loom they untwist, each in its own direction. In making the best qualities of crape both warp and weft threads are twisted. This gives elasticity to the fabric in both directions. When only weft threads are twisted the elasticity is only from side to side. The crinkled surface of crape reflects little light, and thus permits color to be seen to advantage. Silk crapes in rich colors have special beauty. They are used for evening gowns, neck scarfs and similar purposes.

English mourning crape is given its elasticity and crinkled surface, not by weaving, but by a process of pressing between ridged and crisped rollers. Japanese silk crape, one of Japan's most notable textiles, is produced by a process similar to that employed in the manufacture of American crape. The weft threads are twisted in two directions. The web, however, is boiled after removal from the loom. It is then washed, rolled, stretched, and dried in the sun. The result is a soft, clinging, rich, and beautiful fabric.

Cotton and wool crapes are produced by similar methods. A paper, having the crinkled appearance and elastic qualities of the cloth of that name, is called crape paper.

Crash, a coarse, inexpensive, plain-woven linen fabric used for toweling. It is woven usually in narrow widths. It may be bleached, but is sold frequently in the natural color. A smoothly woven quality is used for summer suits by both men and women, and is called crash suiting.

Crassus, Marcus Licinius (about 115 B. C.-53 B. C.), a Roman surnamed Dives, or The Rich. When Sulla landed in Italy, 83 B. C., Crassus joined him and rendered valuable service. Crassus was inordinately found of wealth and unscrupulous in acquiring it, and Sulla permitted him to buy valuable confiscated property for a very small price. He was created praetor in 71 B. C., and took command against Spartacus and the revolted slaves. In 70 B. C., he was elected consul, and had his enemy Pompey as a colleague. In 65 B. C., he was censor; and with Caesar and Pompey was a member of the first triumvirate, in 55 B. C. Undertaking a campaign against the Parthians, Crassus was defeated; and while in conference with a Parthian general he was slain.

Crater. See VOLCANO.

Cravanette, cra-ve-net′, a closely woven, fine twilled, worsted cloth, used largely for men's summer coats and vests. A light weight of fine quality is used for women's suits and dresses. Cravanette, made waterproof by a special process, is used for mackintoshes and raincoats. The uniforms worn by the Salvation Army and the Volunteers of America are made of this waterproof cravanette.

Crawford, Francis Marion (1854-1909), an American novelist. He was born in Italy. His father, Thomas Crawford, was an American sculptor. Young Crawford was educated at Concord, New Hamp-

shire, and at Cambridge, England. He also studied at Heidelberg and Rome, acquiring a wide knowledge of languages and their respective literatures. He was for two years the editor of a paper at Allahabad, India.

In twenty-eight years Mr. Crawford produced forty novels and historical works. He is believed to have reached a larger public than any other American novelist for fifty years. It is interesting to know that in a little book entitled, *The Novel, What Is It?* Mr. Crawford has expressed his own views as to what a perfect novel should be. He does not believe in the "novel with a purpose," but thinks a novel should be an "intellectual, artistic luxury." He says it must be "clean and sweet."

Of Crawford's novels, *Mr. Isaacs* was the earliest and is intensely interesting. It is a romantic tale, involving the occult. The series, *Saracinesca, Sant' Ilario,* and *Don Orsino,* dealing with Italian life among the nobility, is doubtless his strongest and finest work. Others are *Casa Braccio,* which Crawford himself considered his best, *Zoroaster, A Roman Singer, The Children of the King, In the Palace of the King,* and *Via Crucis* and *Whosoever Shall Offend* and *The White Sister* are popular. *Ave Roma Immortallis* is a history of Rome which reads like a romance.

Crawford is the most versatile and various of modern novelists.—Andrew Lang.

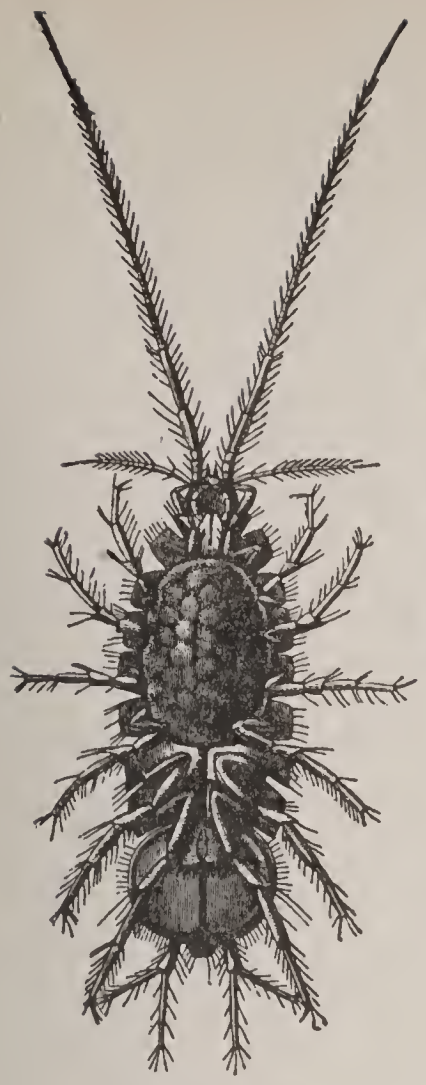
When Crawford first "found himself" as a writer of fiction at the age of twenty-eight, the result was like the rush of an artesian well when rock is pierced, and one book followed another in rapid succession. Those who think that he forced himself to write are mistaken; the writing forced him. When he was at work on a novel he was possessed by it—he heard the characters speak and saw them move, and they were as real to him for the time as living men and women. No novelist who has written many books is always at his best—there would be no "best" if that were so—but Marion Crawford, from first to last, gave all that was in him to his work, and a proof of its high average is that half a dozen people will often give as many different opinions as to which is his "best book."

Crawfordsville, Ind., the county seat of Montgomery County and a manufacturing city, is situated on Sugar Creek 44 miles west of Indianapolis. Among the most important manufactures are matches, flour, foundry products, metal polish and paving brick. The city is the seat of Wabash College. It contains a Carnegie library and has an excellent system of public schools. It was the former home of General Lew Wallace famous as the author of *Ben Hur,* and a beautiful monument has been erected to his memory. The city has an area of 3½ square miles. Population, 10,139.

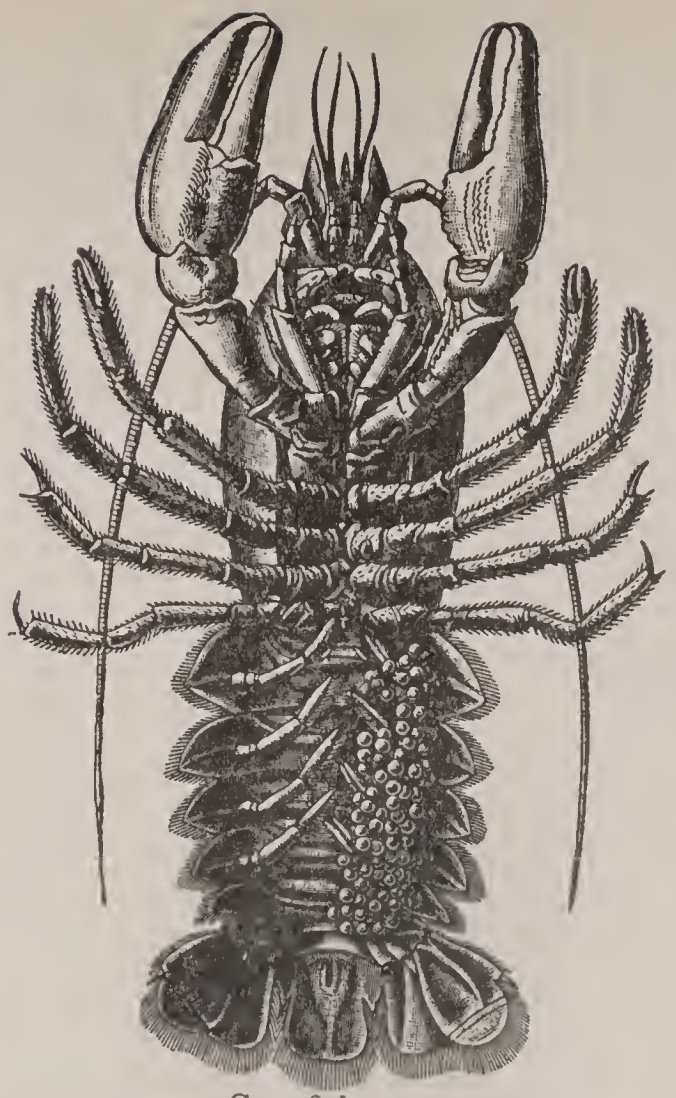
Crayfish, a familiar fresh-water relative of the lobster and the crab. The crayfish crawls about at night on four pairs of legs, either forward, sidewise, or backward, examining muddy bottoms for worms, larvae, snails, etc. The huge pincers, or modified fifth pair of legs which he carries, are useful in crushing weak shells and in tearing food into pieces. When alarmed he brings his fan-shaped tail under his body with a vigorous swoop that causes his body to dart backward with great swiftness. A repetition of the movement and the raising of all the mud he can are his means of escape from the prowling fishes that would gladly give him a nightly shelter. When water is low and his mudflat is exposed the crayfish sinks a well which he constantly deepens as the waters recede, heaping up a ring of marble shaped pellets about the entrance. It is said that a hungry raccoon inserts his paw in the burrow and churns the water up and down. When the crayfish comes up to see what the commotion signifies, the wily coon flips him out, and the burrow is ready for another occupant. At all events, boys in search of "crawfish" bait run an arm up and down in the burrow, churning up mud. A pair of fingers is held in the muddy water at one side of the burrow until first a pair of feelers, and then a pair of stalked eyes appear cautiously at the surface. A quick motion at the critical moment and the crayfish is out. Otherwise, once he sees the bait-catcher, a flip of his tail takes him down to stay down till times are more propitious.

The crayfish is hatched from an egg, and is several years in attaining his full growth. Whenever his shell becomes too small, which occurs several times the first year, he molts it and grows a new one.

Crayfish are common in North America and in Europe, Madagascar, Australia, and Japan, but are found seldom in Asia and

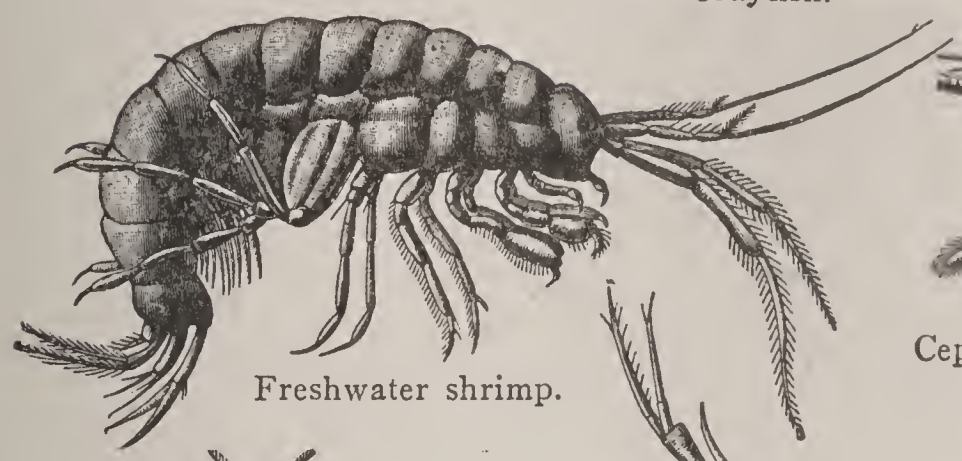


Waterlouse.



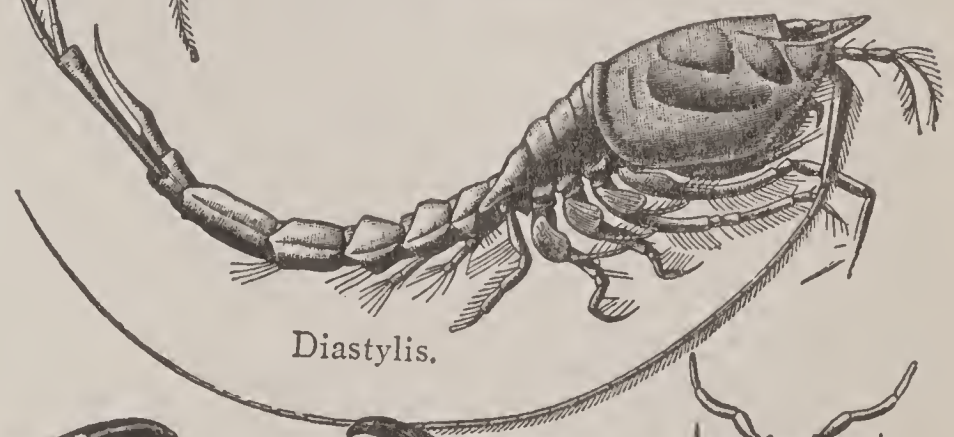
Crayfish.

Squill.

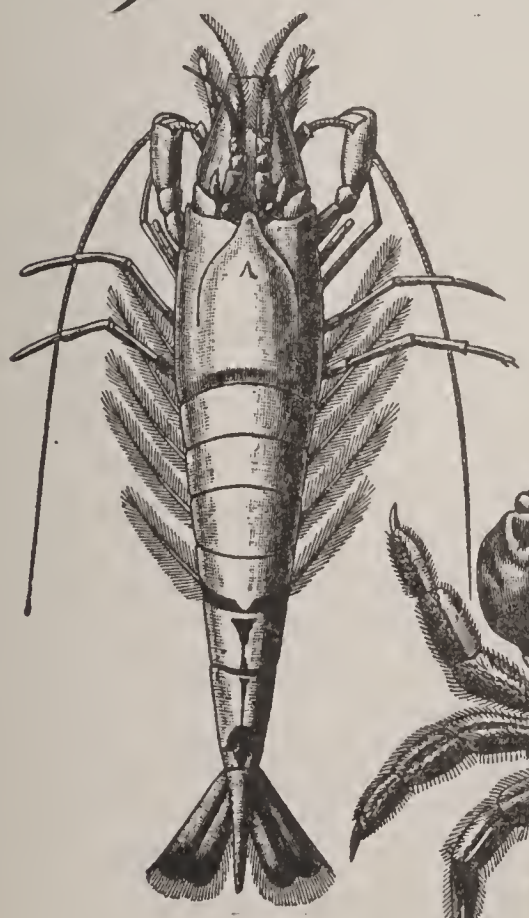


Freshwater shrimp.

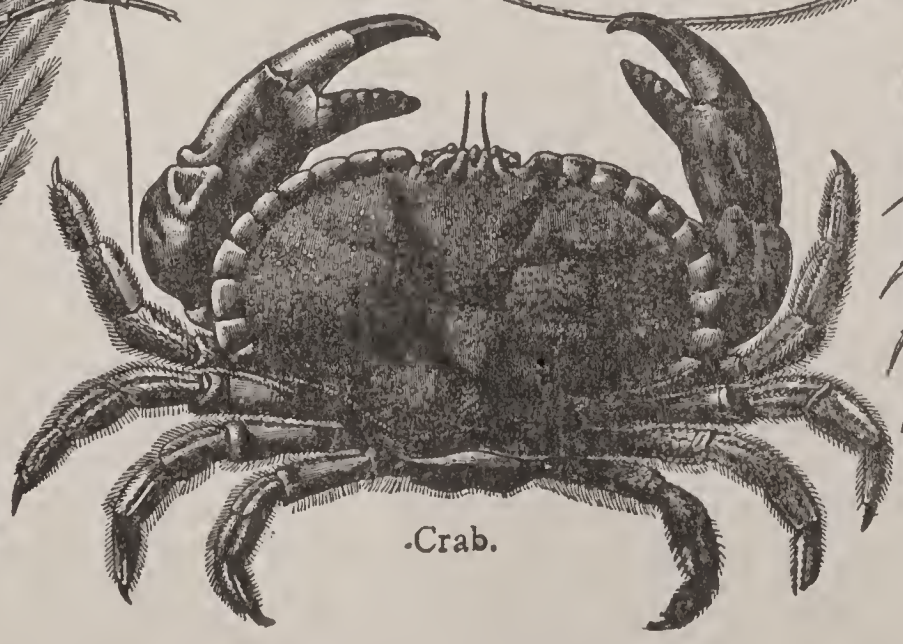
Cephalothorax of crayfish, uncovered.



Diastylis.



Shrimp.



Crab.

Woodlouse.

CRAYFISH AND RELATIVES.

South America and not at all in Africa. The shores of New England are too rocky to favor crayfish. On the lower Mississippi, they cause great damage by perforating the dikes or levees, and giving the surging floods a start at breaking through.

See CRAB.

Crayon. See CHALK.

Crayon, Geoffrey, jĕf′fry krā′un, a pseudonym of Washington Irving, over which he published the *Sketch Book* and other writings. In Irving's complete works, one volume is entitled *Crayon Miscellany.* See IRVING, WASHINGTON.

Cream of Tartar, tär′ter, a white crystalline powder composed of tartaric acid and potassium. It is obtained from the lees, that is to say, the sediment or dregs of wine. It is valuable not only in medicine, but as the essential element of the best baking powder. Efforts have been made to manufacture the drug direct from the juice of the grape. A California association has offered a prize of $25,000 to the scientist who shall make known a method of manufacturing cream of tartar from the juice of the grape, without going through the intermediate process of wine making and settling. Such a discovery would give additional value to the grape crop of that state, as well as decrease the price of an expensive household necessity. See BREAD.

Creamery. See BUTTER.

Cream Separator, an ingenious machine used, as its name implies, to separate cream from milk; it is an invaluable aid to the dairyman. Though there are cream separators of many patterns on the market, the principle is the same in all of them, and is very simple. Centrifugal force and the lightness of cream as compared with milk are responsible for the results obtained by this machine. Milk, the temperature of which should be about 85°, is poured into a containing pan, and flows from this into a bowl or drum that revolves at a high rate of speed, completing from 5,000 to 8,000 revolutions a minute. This causes the heavier part of the milk to fly off to the sides and enter a spout by which it is carried away, while the cream, being light, stays in the center of the bowl or drum and flows thence through a separate spout.

Cream separators are made in many sizes and are operated by hand, steam, gasoline or electric power. The latter is the best power, as it insures the regular speed so essential to good results. The mechanism of a separator is not complicated, but the greatest care must be taken that the parts be kept clean.

Crecy, or **Cressy,** krĕs′sĭ, a village in the northeastern part of France. It is noted for a famous battle, August 26, 1346, in which Edward III of England with an army of 40,000 men defeated the flower of the French chivalry. This battle is reputed as the first in which cannon were used by English troops, "which, with fire, threw little iron balls to frighten the horses." The battle is significant also in that English yeomen armed with the bow gained a victory over gentlemen in armor. The battle of Crecy has been termed the death knell of feudalism—the beginning of the rise of the common people in England and France. Not only were 1,200 French knights left dead on the field of battle, but the usefulness of heavy armor —the possession, the dependence, and the defense of the wealthy and the noble—was past. "The churl had struck down the noble," says Green. In this battle the king's eldest son, Edward the Black Prince, of whom we hear in English history, won great renown for bravery. See BLACK PRINCE.

Credit, a term used by political economists to indicate the confidence of one man or firm in another man's or firm's intention and ability to meet future obligations, derived from the Latin verb *credere, to trust.* John Stuart Mill defines credit as permission to use the capital of another, and this definition is fairly descriptive of the present day working of the credit system. The purest modern form of credit as originally conceived is noticed is the book accounts of modern retail merchants, who extend credit to their customers on faith alone.

In large transactions, however, instruments of credit become necessary; that is, he who would borrow must produce bonds, drafts, notes, mortgages or something else that is more substantial than his mere

promise and good intentions. The lender's purpose here is not so much to insure himself against being cheated as to put himself in such a position that he can secure control of his capital again when it is needed. By transferring to another his claim against the debtor, instead of waiting until the latter can pay, the creditor comes again into possession of his capital and often at the same time does the debtor a service by securing to him an extension of credit.

At the bottom of the entire system of large scale credit is the fact that some people have a surplus of wealth for which they have no immediate use but which they are willing that others use. The banks of advanced and advancing nations are the vehicles of the nation's large credits. On the one hand they secure, in small and large amounts, the surplus funds of those who cannot or will not make direct loans; on the other hand they disburse this wealth, in the forms of loans, in the most useful directions. Thus in an industrially progressive country, while credit cannot be regarded as in itself wealth, it is and should be regarded as the means whereby surplus wealth is employed to produce yet more wealth. That there are dangers inherent in the credit system is recognized by all; but that a properly organized and properly functioning credit system works for the national benefit is also self evident.

Credit, Letter of, a very convenient instrument—a kind of draft—that permits the traveler abroad to draw from foreign banks such sums of money as he may need from time to time. A letter of credit, always issued by a reputable banking establishment, says that up to a certain amount, specified in the letter, the bank of issue will replace in the foreign bank the money drawn by the bearer of the letter. The letter may be directed to one foreign banker, or it may be a "circular" letter. In the latter case it will be honored in almost every part of the civilized world. A letter of credit is worthless to the finder, in case it is lost, as it always bears an accurate description of the person to whom it is issued. The foreign banker pays at the existing rate of exchange, and enters upon the letter the amount drawn, both in the currency of his nation and in that of the tourist. The alternative for the letter of credit is the traveler's note. This differs in that it is issued in coupons. See DRAFT; EXCHANGE.

Credit Mobilier, mo-bē′lier, in United States history, a corporation chartered to build railways. It was an early instance of graft on a large scale. The company was formed in Pennsylvania in 1863 with a capital of $2,500,000. The name adopted was that of a former French banking company with a somewhat similar history. In 1867 the stock was increased to $3,750,000, and the company undertook the building of the Union Pacific Railroad. For a few years enormous dividends were paid and the stock rose rapidly in value. When the exposure came it was found that many honored members of Congress—men who had voted large national bonuses to assist in building the railroad—were stockholders in the Credit Mobilier, and that the company had received outrageous prices for its work. In other words, the organizers of the Credit Mobilier gave stock to senators and representatives in exchange for votes that granted the Union Pacific securities wherewith to pay three prices for the building of the road. A committee of the Senate recommended the expulsion of one member; but no action was taken. A committee of the House recommended the expulsion of two members; but the House contented itself with votes of censure. A number of congressmen were, however, retired from public life; and a connection with this scandal (probably innocent for the most part) cost James G. Blaine the election to the presidency.

Creek. See AMERICANISM.

Creeks, krēks, a tribe of American Indians. They are related to the Seminoles and Cherokees, as well as to the Choctaws and Chickasaws. At their height they numbered from 20,000 to 30,000. They occupied the greater part of Alabama and Georgia. They cultivated gardens and fields of corn, dressed comfortably, and lived in log houses plastered with clay. Their villages were along the streams. They were skillful in the man-

agement of dugout canoes, and in hunting and fishing. Their influence was courted by the English and by the Spanish authorities on the Gulf. They aided the forces of Cornwallis during the Revolution, and at its close afforded a harbor for Tory refugees driven from the southern colonies. During the War of 1812 a band fell on Ft. Mimms near Mobile and massacred 500 men, women, and children. The entire nation was punished severely in the battle of Horseshoe Bend in 1814. Two thousand warriors were slain. In 1825-28 their lands were taken by the United States. In 1836 about 25,000 Creeks were transported to Indian Territory, where they settled with their slaves, and still form one of the Indian nations. During the Civil War they divided. About 1,000 enlisted in the Union army. The Confederate section drove the others out of the territory. The number has been increased by whites and negroes to 40,000, but the Creeks proper number about 8,000. A few hundred escaped from the troops at the time of the removal, and still linger in their native mountains, trapping, hunting, fishing, raising patches of corn, and acting as guides for white hunters. See INDIAN TERRITORY.

Creeper, in American ornithology, a small bird six inches long, with white under parts and upper parts of mixed colors, giving the general impression of brown. The brown creeper breeds from Maine and Minnesota northward, hiding its nest in a hole or behind a piece of loosened bark. It has a stiff tail which it uses, woodpecker-fashion, as a prop in climbing. It may be seen examining the bark of trees, an occupation well described by Chapman.

The patient, plodding brown creeper is searching for the insects, eggs, and larvae which are hidden in crevices in the bark; after watching him for several minutes one becomes impressed with the thought that he has lost the only thing in the world he ever cared for, and that his one object in life is to find it. Ignoring you completely, with scarcely a pause, he winds his way in a preoccupied, near-sighted manner up a tree trunk. Having finally reached the top of his spiral staircase, one might suppose he would rest long enough to survey his surroundings, but, like a bit of loosened bark, he drops off to the base of the nearest tree and resumes his never-ending task.

Cremation, the process of burning, or reducing to ashes the bodies of the dead. Doubtless this method of disposal of dead bodies was prevalent in prehistoric times. Ancient graves have been found in many places which contain no bones, but instead there are urns holding funeral ashes. Previous to the time of Christ cremation was the general practice among civilized nations, with the exception of the Egyptians, who embalmed the bodies of their dead, the Jews who laid them in sepulchers, and the Chinese who buried them in the ground. That burial came to be almost a universal custom was due, probably, to several causes, chief among which was the belief in the resurrection of the body. Cremation, for sanitary reasons, began to be urged as early as the seventeenth century, but not until the latter part of the nineteenth century did the matter receive much attention either in Europe or America. Many eminent physicians published their views on the necessity of cremation as a safeguard to public health, especially in densely populated districts. Thus the idea gained ground. In 1876 a semi-private crematorium was erected in Washington, Pennsylvania. The first public crematorium in the United States was opened in New York City in 1881.

Although the process varies as to details, that employed at this New York crematorium will give a fair idea of the usual custom. The body, removed from the casket which is burned separately, is wrapped in an alum-soaked sheet and placed in a retort, which is then subjected for several hours to extreme heat. The bone ash, which by reason of its greater weight, is separated readily from the ashes of the clothing, is gathered and sealed in a canister. A chapel at the crematorium may be used for funeral services if desired.

At the close of the year 1900 there were in the United States twenty-four crematoriums at which 13,281 bodies had been cremated. The objection to cremation, despite the statements of physicians as to its necessity, seems to be strong. It is, however, a matter of sentiment which can have no foundation of sufficient strength to stand against the needs of protecting the health of the living. The time is not far distant,

probably, when cremation will have become a universal custom.

Cremona, krē-mō′na, a city on the northern bank of the Po, famous in the sixteenth and seventeenth centuries for the making of violins. In fact the violin acquired its present shape and its highest quality of excellence at Cremona. Among the noted makers were Stradivarius and Amati, the latter being the name of a family rather than an individual. A genuine old "Cremona" is exceedingly valuable on account of its rarity, and commands a high price. The modern city has a population of 30,000 people and is the seat of considerable local trade. It boasts one of the finest towers in Italy, nearly 400 feet in height, commanding an extensive view of the fertile plains of the Po. There are manufactures of silk, earthenware, and of mustard. See VIOLIN.

Creole, krē′ōl, in Louisiana, a name applied to pure white people born in this country, but of French ancestry. The term is also applied, but less frequently, to those of Spanish blood. They are distinguished as French creoles and Spanish creoles. In a country where there are many people of mixed blood, the term is one of honor, conferring social standing. In the West Indies the creole is one of pure Spanish ancestry, as distinguished from the people of mixed blood and immigrants from other European countries. The term is also applied, but improperly, to a negro born in this country, as distinguished from those imported from Africa. Taken without modification, a Louisiana creole is a person of pure French ancestry born in this country. The traditions, aristocratic customs, and family pride of genuine creole society are well described by G. W. Cable in his *Old Creole Days, The Grandissimes, The Creoles of Louisiana,* and other volumes.

Creole State. See LOUISIANA.

Creosote, krē′ō-sōt, a substance having the general appearance and qualities of carbolic acid. Creosote was prepared first from coal tar by repeated treatment with potash and acids, followed by distillation. It rises from the tar at a high temperature, 400° to 760° F. It is obtained also by the destructive distillation of wood. Pure creosote is an oily, heavy, colorless liquid. It refracts light powerfully. It has a sweet, burning taste and smells like a smoked ham. The word is from the Greek meaning flesh preserver. It is one of the strongest preservative agents known. Meat dipped in a one per cent solution of creosote is safer from spoiling than if smoked.

Creosote water is used in medicine. It stimulates digestion and kills bacteria in the intestines. Creosote vapor is inhaled with helpful effect by consumptives, and by patients afflicted with bronchitis. Severe cases of nausea are sometimes relieved by creosote. Though less dangerous than carbolic acid, creosote should be used as a remedy only under competent advice. Creosote is added to whiskey to give the desired flavor of reeking peat, much as though the whiskey had been distilled over a smoking peat fire.

Creosote is an excellent preservative of wood. By killing germs of decay it prevents dry rot; posts dipped in hot creosote last longer. In this respect the action is like that of tar. Owing to the advancing price of railroad ties treatment with creosote has been employed with excellent results. The life of a wooden pavement may be tripled by the use of creosote. The blocks are placed in a cylindrical steel drum; the air is first exhausted by an air-pump causing the vapors of the wood to pass off by expansion; creosote oil, boiling hot, is then introduced. By tumbling the blocks awhile in the drum, they are so impregnated with creosote that they become practically rot-proof. It is claimed that a pavement of creosoted blocks, well laid in boiling tar and gravel on a concrete foundation, will outwear and outlast several ordinary wooden pavements. The treatment of ties is not essentially different.

Crepe Lisse, krāp lees, a thin, gauzy silk fabric, plain woven, and stiffened in finishing with sizing. Sometimes it is crimped to imitate real crape. It is used for ruchings, trimmings, and millinery purposes.

Crepon, krā-por′, a name signifying coarse crape, applied to several articles of worsted fabrics made in imitation of real

crape. The crinkled effect of crêpon is produced by the Jacquard loom. Two sets of warp threads are used, the one having greater tension than the other. The lower set, which is sometimes of cotton, forms the foundation of the fabric. The upper set forms the face and is of silk, wool, or mohair. The Jacquard loom is so arranged that certain warp threads are skipped in the weaving to form a pattern. The varied effects produced are described as pebbled, cockled, dimpled, soufflé, brocaded, blistered, etc. The fabric is dyed and finished with as little stretching as possible, that the crinkle effect may not be lessened. The material is sometimes silk striped, sometimes embroidered with silk on the Swiss embroidery machine. Crêpons are classed frequently as "novelty goods." Cotton crêpon is woven of yarns which have been mercerized and then protected by gum or some gelatinous substance from the action of caustic soda. These yarns are used in combination with others not so protected. The fabric is then treated with a solution of caustic soda which shrinks the unprotected yarns, producing a crinkled effect. See MERCERIZING.

Crescent, the moon in its first quarter, —the new moon. The word is Latin, meaning increasing, and has no reference to shape. It was applied to the new moon as growing, increasing; but the name has been transferred from the growth to the curved shape, the thick body, and tapering horns of the young moon, and, inappropriately, to the last quarter, when the lighted portion of the moon is indeed sickle shaped, but is waning instead of waxing. The Egyptian and the Greek worshipers of the moon decorated their goddesses, Isis and Silene, with the crescent. Athenian citizens of illustrious birth were permitted to wear crescents of silver and ivory on their buskins as insignia of rank. The patricians of Rome claimed a similar privilege. The crescent was adopted by the Roman empire as the symbol of growing power and eternal dominion. The crescent was favored in the eastern cities, as at Byzantium, possibly by way of distinction from the Roman eagle, the military emblem particularly of Rome and the western empire. The Turks appear to have adopted the crescent after they took Constantinople. Since that date the crescent has been the emblem of Islam, as the cross is the emblem of Christianity. New Orleans, built around a bend of the Mississippi river, is on that account called "The Crescent City."

Crescent City, a popular name for the city of New Orleans.

Crete, krēt, the most important island in the Greek Empire. The inhabitants are chiefly Greeks. It is situated in the eastern Mediterranean, eighty-one miles south of Greece. It is 160 miles long and from 7 to 35 miles broad. Area, 3,326 square miles. The highest peak attains 8,060 feet in altitude. It is a country of valleys and springs, luxurious vegetation, and a mild climate. The present inhabitants are engaged largely in the raising of goats and in producing olives, olive oil, soap, wool, fish, figs, acorns, wine, wheat, oranges, lemons, silk, and honey. The ordinary yield of olive oil is 10,000,000 gallons. In 1821 Crete rose with the rest of the Greeks, but did not obtain independence. In 1868 and again in 1896, there were uprisings. Crete had been in an uproar for seventy years. Great Britain, Russia, France, and Italy intervened; as a result of which semi-independence was granted the Cretans. They were tributary nominally to Turkey, but they had a national assembly and a regular constitution. In 1908 Crete took advantage of the disturbance in Turkey and proclaimed a union with Greece. The four powers intervened again, however. A combined fleet required the Cretans to haul down the Greek flag.

Agitation for annexation to Greece continued, however, and in October, 1912, Cretan deputies were admitted to the Greek parliament, and in November, 1913, Crete was formally annexed to Greece. This was soon after recognized by the Powers.

The population of Crete in 1911 was 342,151. Of these about seven-eighths were members of the Greek Church. The rest of the people, with the exception of a few Jews and foreigners, are Mohammedans. There are about 3,500 Greek churches and chapels and about fifty-five

Mohammedan mosques. All of the inhabitants of the island speak Greek. Canea, the capital, had in 1911 about 25,000 inhabitants.

In Greek mythology, Crete is the alleged scene of many of the adventures of the gods and heroes. Saturn reigned here. Minos, who built the fabled labyrinth, dwelt in Crete. The ancient world derived its supply of chalk from Crete, whence the name Cretan earth.

Creusa, cre-u′sa. See AENEAS.

Cricket, an insect closely related to the grasshopper and locust. The old English name is grig, whence the proverbial expression, "as merry as a grig." The back is flat. The wing covers bend squarely down over the sides of the abdomen. The antennae are long. "Black, glossy crickets," says Holmes, "with their long filaments sticking out like whips of four-horse stage coaches." The characteristic noise or chirp is made by the male by raising his wing covers and rasping one on the other. An examination of a male cricket shows that ridges and rasping edges, used like a fiddle and bow, are admirably and ingeniously adapted to produce chirps at the player's pleasure. Crickets, like grasshoppers, lay their eggs in pockets in the earth to hatch the following spring. In grain-producing regions crickets sometimes infest grain shocks and do not a little damage, especially by way of cutting bands. They get into clothing also, and cut holes. If a coat be left on the stubble over night, it is likely to be riddled. Crickets have an active, cheerful way that has made them a place in literature and in the regard of households, well expressed in Dickens' *Cricket on the Hearth.* The following is a more juvenile view:

Old Dame Cricket,
Down in a thicket,
Brought up her children nine—
Queer little chaps,
In glossy black caps
And brown little suits so fine.

In olden times the Florentines kept crickets in cages for good luck. The custom still prevails, it is said, in some parts of Japan. See CICADA; GRASSHOPPER; LOCUST; KATYDID.

Cricket, the national ball game of England. The term is probably related to "crooked," in reference to the shape of the crooked hockey-like bats with which the game was formerly played. The regular match game is played by two elevens. At one time a game of the village green and of the school, cricket has become as professional as baseball in this country. Games are played by clubs in circuits, with immense crowds in attendance. As compared with baseball the game is played with two wickets instead of four bases. The pitcher is called a bowler. The bowler aims to knock down the wicket behind the batsman. A run is made from a wicket to the bowler's crease in front of the other wicket. Thomas Hughes' *Tom Brown at Rugby* gives a stirring picture of a cricket match. American boys consider the game a trifle tame in comparison with baseball. See BASEBALL.

Crime, an act or an omission punishable by law. An offense, however repugnant to a sense of right and wrong, is not a crime until the law makes it so. In the full legal sense a crime is any offense against the law; but violations of local ordinances, subject to fines only, are not regarded usually as crimes. A capital crime is a crime punishable by death. Murder, piracy, and treason are the capital crimes of most governments. Crimes punishable by death and those punishable by imprisonment in a penitentiary are ordinarily called felonies. Offenses below the rank of felonies are known as misdemeanors. High crimes are felonies; petty crimes are misdemeanors. See CAPITAL PUNISHMENT.

Crimea, krī-mē′a, a peninsula of southwestern Russia included between the Black Sea and the Sea of Āzov. It contains an area of 15,060 square miles, with varying surface features from steppes to mountains. The steppes are, for the greater part, pasture land. The southern slopes of the mountains produce grapes, olives and mulberries. The northern slopes produce orchard fruits or grain. The metropolis and seaport is Sebastopol, with a population of 61,850.

The peninsula is noted as the seat of the Crimean War of 1853-6. In pursuance of

designs on Turkey, including the control of Constantinople and the Bosporus, the Russians fortified the heights of Sebastopol, converting the port into a fortress second among Mediterranean towns to Gibraltar only. In 1852 Russia deemed the time propitious to make demands on the Porte, this time for the right to protect Christians within the Turkish dominions. The demand was refused. The Russians advanced on Constantinople. The English and French, sinking national antipathy, hastened, not so much to defend the Turks, as to drive back the Russians. Joined by Sardinia, eager for a seat at the council board of nations, the allies dispatched a force of soldiers and a fleet far surpassing the famous Spanish Armada. The Crimea was invaded September, 1854. The famous battles of Alma, Balaklava, and Inkerman were fought. The Russian defense of Sebastopol is comparable with that of Port Arthur in the Russian-Japanese war. Not until September 8th of the following year did "the flags of the Allies wave from the tower of Malakoff." For the famous charge of the Light Brigade, see BALAKLAVA.

In the treaty of peace that followed, Russia was forbidden the use of war ships on the Black Sea. The passage of war ships through the straits of Dardanelles was also forbidden.

In the Great War, Crimea was overrun by the Germans after the collapse of Russia. Following this misfortune it was subject to Bolshevist misrule, from which, in 1919 and 1920, it tried to become free.

Criminal Law. See LAW.

Criminology, that branch of social science that treats of crime in all its aspects, is of comparatively recent origin, generally held to have begun with the publication, in 1876, of *Criminal Man,* a remarkable study of the criminal. Cesare Lombroso, the author of *Criminal Man,* held the extreme opinion that the criminal is born, not made, and is an essentially atavistic type of man, possessed of a savage nature, and marked also by abnormalities of physical structure. Among the latter, Lombroso named assymetry of the skull, limited cranial capacity, retreating forehead, heavy jaw, coarse hair and relatively scanty beard in comparison with the hair of the head, abnormal features and frequent lefthandedness.

The reaction against Lombroso's theories quickly followed; and soon there were two distinct schools of criminologists, the one holding with Lombroso, the other going toward the other extreme and voicing the opinion that the criminal is made by his environment.

Whatever the intrinsic merits of these two views may be, Lombroso must be accorded full credit for having laid the basis of the scientific study of crime and criminals by sociologists, psychologists, jurists, educators and others, with a view to removing the causes of crime, and of reclaiming the criminal by reforming him.

It is usual for modern investigators to name three factors as the causes of crime—cosmic factors, social factors, and individual factors. But it is admitted that sharp division between these causes is impossible, since each shades into and modifies the other so frequently as to make the study of crime extremely difficult.

Among the cosmic factors causing crime are listed climate, soil, seasons, the physical features of the earth's surface, and the products of the earth. From the consideration of these as determinants of man's actions, it has been shown statistically that crimes against the person are more frequent in warm than in cold climates, while crimes against property are more frequent in cold than in warm climates. More specifically, it has been noted that crimes against the person are more numerous in July and August than in December, while in the latter month, crimes against property are more numerous.

Seemingly more potent than cosmic factors—if the importance attached to the various factors by criminologists be accepted as a criterion—are social factors. Social factors are so numerous and complicated that their effects upon the individual are obscured, and only the most patient and exhaustive analysis can assign to each its due of potency. Some of the more patent facts revealed by study of the criminal are that the percentage of crime is greater among

the unmarried and divorced, male and female, than among the married; that the percentage of crime decreases as the scale of occupation is ascended; that, per capita, more crimes are committed in densely populated areas than in areas that are sparsely populated—Berlin, London, Paris and New York having a larger criminal element, comparatively, than have smaller cities; that, while poverty as such cannot be considered a prime cause of crime, extreme poverty in juxtaposition with great wealth, thus causing envy and class hatred, not only can but must be so considered.

Investigators attach great significance to poverty and its companion, ignorance, as causes of crime; and this class of investigators usually set aside, at least in part, Lombroso's theory of the born criminal. During periods of economic depression, crime is invariably more usual than when such depression is absent. Want tends to break down the restraining influence of family life by compelling each to shift for himself.

Among the individual factors that go to modify the factors considered above, sex, age, education, drunkenness and heredity are no doubt the most important. In all lands, there are more male than female criminals, for the reason that women and girls are less active and less given to violence than are men and boys. Men who enter the criminal class usually do so at an early age and remain in that class longer than do women. The question as to whether increase of education decreases crime has not been answered positively; but investigation indicates that the populations of jails and prisons are usually very ignorant.

It is admitted that drunkenness increases crime, but it has not been shown what causes drunkenness, which is itself a form of crime. How many and how far criminal traits, if such there be, are hereditary, no one can say. Considering the findings of the later psychologists as to early impressions and their influence on later life, the problem becomes still more complicated.

Meantime, many laudable corrective and preventive measures have been adopted in all progressive countries. Correction with a view to prevention has largely supplanted punishment in penal institutions, since it was proved that cruelty served only to increase crime. The harshness of sentences has been modified and the conditions under which sentences are served have been improved, with gratifying results. The improvement of moral standards, conditions of home life, and education have prevented more crime than harsh treatment ever prevented; and these will contine to prevent crime so long as an extremely relaxed and sentimental attitude toward it is not adopted.

Crinoidea, Sea Lilies or Feather Stars, a group of sea animals, the existing forms of which are found at a moderate depth, and sometimes in shallow water. During a portion or the whole of their lives they are attached to the bottom of the sea by a jointed stalk or stem. Some of them break off from the stem when mature, and are perhaps enabled to swim by means of muscular contractions of the arms. The living representatives of this class number five or six hundred, while their fossil remains are found in abundance in limestone formations. Their popular name is due to their resemblance to flowers, and some of the forms are extremely graceful and full of beauty.

Crinoline, crĭn′ō-lĭn, a stiff lining fabric composed of horsehair and linen. The name is derived from the Latin words *crines,* hair, and *linum,* flax. The so-called crinoline of the present day is made frequently of coarse cotton yarns. In finishing, the fabric is heavily sized to take the place of the natural stiffness of the horsehair fabric. Crinoline was first used about the middle of the nineteenth century to stiffen women's skirts. When the fashion of expanding the skirts grew to the exaggeration that demanded hoops or hoop skirts, the word crinoline was retained in the phrase "wearing crinolines," which implied the wearing of hoops.

Crinum, a genus of bulbous-rooted plants, bearing long, tubular flowers. About 80 species have been found, these being natives of tropical and sub-tropical countries. The flowers are large and beautiful and are very ornamental in the greenhouses where they are grown when trans-

planted, although they are semi-hardy, and with a little protection will survive the winters as far north as Washington. A great many hybrids have been produced, some of them being very beautiful and fragrant. One species is a native of Florida.

Cripple Creek, a town in El Paso County, Colorado, is on the Florence & Cripple Creek and the Midland Terminal railroads, fifty miles west of Colorado Springs. It is the trade center for the Cripple Creek mining district, in which the output of gold from 1902 to 1914 was enormous. The Roosevelt drainage tunnel, finished in 1910 at a cost of $750,000, made possible deep mining. The district in which it is situated has been rich in gold-bearing veins, the mining of which gave rise to the founding of Victor, Altman, Goldfield and other mining towns. From the peculiar nature of the ores found in this vicinity, new methods of mining became necessary, attracting the attention of prominent metallurgists.

Cripple Creek is situated at an elevation of 9,800 feet, and is noted for its picturesque scenery and its healthful climate. There are cyanide mills, smelters and various other industries allied to mining, banks and daily and weekly newspapers. In 1900 its population was 10,147, while in 1920 the population was 2,325.

Crisp, Charles Frederick, (1845—1896), an American jurist, was born in Sheffield, England, January 24, 1845. He came to the United States and served in the Confederate army. He was admitted to the bar and became Solicitor General for Georgia in 1872, and later he was Judge of the Supreme Court. He resigned from the last named office, and become a member of Congress, where he was speaker in 1891 and again in 1893. He died at Atlanta, Ga.

Cristofori, Bartolommeo (1655—1731), an Italian maker of harpsichords, and the inventor of the hammer action used in the modern piano. He was born at Padua, where he manufactured instruments until 1687, when he was urged by Prince Ferdinand, son of the Grand Duke Cosimo III, to remove to Florence and continue his work there.

A piano made by Cristofori in 1720 is said to be in Florence.

Crispi, kres'pe, **Francesco** (1819-1901), an Italian statesman. He was born at Ribera, Sicily. He studied law at the University of Palermo and began the practice of his profession at Naples, 1846. At the outbreak of the Sicilian revolution he became active in guiding the insurrection and upon the restoration of the Bourbons was obliged to flee from Sicily. Continuing to conspire for the redemption of Italy he was driven in succession from Piedmont, Malta and Paris, at last joining Mazzini in London. In 1859 he returned to Italy, declaring himself openly a Republican and in favor of national unity. In the insurrection of 1860 Crispi served as mayor under Garibaldi and the following year was returned by Palermo to the first Italian parliament. In 1876 he became president of the Chamber of Deputies, minister of the interior in 1877, and prime minister in 1887, filling the latter office till 1891, and again 1893-1897. Crispi favored the triple alliance of Italy, Germany and Austria, and formed warm friendships with Bismarck and Gladstone. His popularity in Italy suffered by his support of the Triple Alliance and by reason of his measures regarding taxation. Two attempts were made to assassinate him. His political enemies brought charges against him which, although he was acquitted, injured him in the eyes of the people. In spite of this he was re-elected to Parliament in 1898 by an immense majority. He was now an old man and growing blind. An operation restored his sight, but his general health failed and he was obliged to give up his political activity. Crispi was remarkable for his intense patriotism, his earnestness in working for reform and his ability to arouse his fellow men to a realization of the needs of the times and of their duty as citizens.

Crispin, a Roman martyr of noble family. Obliged to flee from Rome during the persecutions of Diocletian, Crispin maintained himself in what is now Soissons, France, by making shoes. He was so charitable, the legend runs, that he even stole leather to make shoes for the poor.

1. Caiman, Central and South America. 2. Crocodile, Nile River. 3. Salt Water Crocodile, Malaysia. 4. Gavial, Ganges River.

CROCODILES.

blows and knock its prey around in reach of its mouth. The crocodile hunts its food around the margins of rivers and ponds, keeping all but the upper part of its head under water. It sinks when alarmed and can stay under the water for an hour and a half at a time. It swims with the tail, not with the feet. The chief food of the crocodile is fish. Large prey is hidden in a water hole and later dragged ashore to be eaten. The eggs, thirty to sixty, somewhat smaller than those of a goose, are deposited in a low heap of muck on the hot sand, and left for the sun to hatch, though it is said that the female defends the nest and scratches off the sand to liberate her young.

The crocodile of the Nile was held in reverence by the natives. Crocodile worship rose to such an extreme that sacred crocodiles were kept in temples, adorned with jewelry, led in religious processions, and mummified when dead. The crocodiles of the Ganges were also protected by idolatrous ideas and grew exceedingly bold and dangerous, especially as they had acquired a shark's appetite for human victims.

The crocodile is distributed more widely than was supposed. In 1875 genuine crocodiles fourteen feet long were discovered in Florida. The scales are ridged more sharply and the snout is narrower than in the case of the alligator. Their habits and haunts are much the same. In addition to two gavials of northern India and Borneo, and five caimans of the Amazon region, there are no less than ten genuine crocodiles. They are found in Florida, Central America, Cuba, Australia, and Malaysia, also in the Orinoco, the Niger, the Congo, the Nile, and the Ganges Rivers respectively.

The crocodile of the menageries is caught napping on the sand. A dozen half naked Africans armed with clubs fight him away from the water's edge until a lucky blow half stuns him. Then they pile on, bind his jaws together with a rope, tie his feet to his body, and lash him to a stiff pole. The trapper then floats him down the river and puts him into a cage ready for shipment—probably to Hamburg.

Crocus, a genus of plants belonging to the iris or flag family. The word is the Greek name for saffron. In fact the saffron of commerce is the pollen of the common crocus of the Mediterranean regions. About thirty species of the crocus are known to the American florist. Bulbs planted in the fall beneath the shelter of rich litter send up large flowers of many colors in early spring. Holmes speaks of

> The spendthrift crocus, bursting through the mold,
> Naked and shivering with his crop of gold.

Croesus, krē′sus (560 B. C.), the last king of Lydia in Asia Minor. He extended the limits of his father's kingdom. From tribute mines and the sands of a local mountain stream, the Pactolus, he accumulated so much gold that "as rich as Croesus" became a proverbial expression. In his prosperity he deemed himself the happiest of mortals; but Solon, the wise Greek, denied him the title, saying no man could be sure of happiness during his lifetime. Surely enough, misfortune overtook him. His favorite son was killed, and Cyrus, the Persian, took away his wealth and his dominion.

Cromlech, krŏm′lĕk, an ancient Celtic place of burial. It consists essentially of three or more upright stones supporting an unhewn slab beneath which sepulchral remains are found. Very frequently the cromlech shelters a burial urn or chamber, lined with stones and containing a skeleton, with weapons, pottery, and other indications that the dead were persons of rank. These sepulchers are commonest in the territory last occupied by the Celts, as Ireland, Scotland, Wales, Cornwall, Devonshire, and Brittany; but they are found throughout England and many localities of the continent. Sometimes a slab is no larger than two persons may lift. Many are very heavy, however. That of a celebrated cromlech in Cornwall is calculated to weigh twenty tons; the capstone of one in Wales is 12 feet long, 10 feet wide, and 4 feet thick; one near Dublin, resting on 6 blocks, is 23 feet long, 17 feet wide, and 6 feet thick; the Witches' Stone in the vicinity of Edinburgh is about 10 feet wide and 12 feet in length.

Crompton, Samuel (1753-1827), an English spinner and weaver; the inventor of the spinning-mule. Crompton was born at Firwood, near Bolton, Lancashire. His parents were poor and, like other farmers in that vicinity, eked out a scanty living by spinning and weaving. The father died while the children were still young. His widow struggled hard to educate her children, and young Crompton put forth every effort to obtain a mathematical education. Finding himself hindered in weaving by the difficulty of getting suitable yarn, he set to work to invent some machine by which better yarn could be spun and greater quantities produced than by the Hargreaves jenny. For five years Crompton labored, almost literally night and day, and spent every cent he could spare to carry out his project. The machine which he finally constructed produced such fine yarn that his house was beset by people wishing to discover his secret. It is said that ladders were placed against his windows in the effort to obtain a sight of his machine. Crompton could not afford to take out a patent. At last, under the written promise of a liberal subscription, he disclosed his invention to certain manufacturers. He received in return less than $300. He set to work bravely, however, to build up a manufacturing business. Years afterward, near the close of a toilsome life, he received from Parliament a reward of $25,000 which was entirely inadequate to the needs of his manufactory. The importance of Crompton's invention cannot be overestimated. The Hargreaves jenny and the Arkwright roller frame made possible the Crompton spinning-mule, but it at once superseded the earlier machines. Thirty years after Crompton brought out his machine there were twelve times as many in use as there were Arkwright frames, while the Hargreaves jenny was left still farther in the rear. See SPINNING; HARGREAVES; ARKWRIGHT.

Cromwell, Oliver (1599-1658), lord protector of Great Britain and Ireland. Born at Huntington, April 25, 1599; died in London, September 3, 1658. The Cromwell line of knights dated from the reign of Queen Elizabeth. Oliver's mother could trace her descent back to Alexander, lord steward—or Stuart as the name came to be written—the founder of the family on the throne of England. Cromwell married a daughter of a landed proprietor who prefixed Sir to his name so that he was, we may say, well connected on all sides.

Cromwell appeared in Parliament in 1628. Although clad in slouchy, rustic dress, he had had a year at Cambridge. He proved to be a man of rude, ready, impressive eloquence, a determined friend of fair play. He was a zealous advocate of freedom in religious matters—opposed to the idea of a state church. He at once became prominent and influential. At the close of the term for which he was first elected he retired to a farm at Ely which he had inherited. He came to be known as a god-fearing, earnest, just man—a raiser of cattle.

A thoroughly characteristic anecdote is told of his fairness in neighborhood matters. Some enterprising speculators formed a plan to drain the fertile fens and swamps near Ely, in order to convert them to their own use. Cromwell withstood the projectors so stoutly as to defeat the scheme. His poorer neighbors whose rights of pasturage he thus upheld had unbounded confidence in him and dubbed him the "lord of the fens." Later, when troublous times broke out, these same neighbors followed him through thick and thin. No matter what odds were opposed, no matter how deeply he might charge into the ranks of the enemy, these old Ironsides, as his regiment came to be called, were at his back, laying on lusty blows for country, for God, and for Oliver. Cromwell was one of the greatest leaders of men the world has seen. His influence sprang from the very fens of his native shire. Leadership of men begins at home.

He was a member of the several Parliaments that were summoned and sent home by the king. When bitterness, springing from the broken promises of the king and religious factions, rose so high that actual hostilities broke out between the royalists and the adherents of Parliament, Cromwell formed the famous troop of cavalrymen to which we have referred and

took the field. He was without doubt a military genius. Practically without military experience until he had reached the age of forty, he transformed raw recruits into the most formidable body of soldiers in Europe. Like Joab of old he never lost a battle. His first exploit was the capture of military supplies at Cambridge in 1642. Marston Moor, Naseby, and a score of victories followed. Cromwell and his "praying, snivelling, long-faced troop," ever in the thick of the fight, hewed down the "sons of sin—the children of the harlot that sits on seven hills."

Cromwell rose higher and higher in command, until he became the embodiment of the Puritan cause. King Charles I was driven into Scotland, brought back, and beheaded on the charge of breaking his word with Parliament. Cromwell's signature stood third on the death warrant. Ireland was quickly wrested from the royalists. Charles II raised the Stuart banner in Scotland, but was defeated at Dunbar, Stirling, and Worcester. December 12, 1653, Parliament, now subservient to Cromwell, proclaimed him lord protector —a sort of president—of the Commonwealth.

Cromwell pursued a vigorous policy at home and on the sea. He was the leading man in Europe—a sort of Bismarck among crowned heads. Without increasing taxes, he caused public business to be managed honestly. Judges were appointed to do justice to all classes of people. He lived at Hampton Court a few miles up the Thames, but, as it happened, died at Whitehall Palace in London. He was buried in the beautiful chapel of King Henry VII in Westminster Abbey. He was succeeded for a few months by his son Richard, a weak man.

In 1659 the same Charles who was routed at Dunbar was restored to the throne of his father as Charles II. One of his first acts was to order the body of Cromwell taken up and hanged at Tyburn. The body was afterward buried beneath the gallows. The head was cut off, fixed on a pole, and set up at Westminster.

In early manhood, Cromwell, Pym, and others, who afterward became famous in the councils of the Parliamentary party cherished for a time the project of joining the Puritan colonies in New England. During Cromwell's term of influence the immigration to the American colonies largely ceased, because the persecutions of the Puritans ceased, though they were but partially tolerated, and obtained but a limited recognition.

The worst stain on Cromwell's memory is his cruel, not to say brutal, treatment of Ireland. Under his direction the Catholic Irish adherents of the Stuarts were butchered with a degree of ferocity worthy of Indian warfare.

See CHARLES II; COMMONWEALTH.

Cronus, or **Kronos,** krō′nŭs, in Greek mythology, one of the Titans, son of Uranus (Sky) and Gaea or Ge (Earth). Cronus married his sister Rhea and reigned in Olympus during the Golden Age. Then Zeus, the son of Cronus, led a rebellion against his father and the Titans, and Zeus was victorious; the Titans were driven into Tartarus and punished in various ways. Zeus now reigned in Olympus. Cronus was sometimes called the god of time. This idea seems to have arisen from the similarity between the words Cronus and Chronos, time. According to later authorities, the word Cronus is from an entirely different root. See SATURN; MYTHOLOGY; GOLDEN AGE; HESIOD.

Crook, George (1828-1890), an Indian fighter. He completed the West Point course in 1852, and served with gallantry at South Mountain, Antietam, and Chickamauga. He was with Grant at Appomattox. After the Civil War he rose to the rank of major-general, and was commander of the United States forces in Idaho, Arizona, and the department of the Missouri. He rode in many a hard campaign against the Apaches, Comanches, and Sioux. He died at Chicago. See MILES; APACHE; CUSTER.

Crookes, William, an English electrician and chemist. He was born in London June 17, 1832. He was educated at Oxford. At thirty-one he was a fellow of the Royal Society. In 1897 he was knighted for brilliant discoveries in physics. He is the author of a number of practical

works pertaining to the manufacture of beet root sugar, dyeing, the sewage question, etc. He is best known, however, as the inventor of Crookes' tubes. They are sealed glass bulbs or tubes from which the air has been exhausted to a high degree of rarefaction. Sir William Crookes discovered that by passing electrical currents through these tubes they were lighted up brilliantly with green, pink, and many other colors, highly suggestive of the northern lights. See X Rays.

Croquet, kro-kā′, a lawn game played with mallets, balls, stakes, and wickets. A stake is driven at each end of the ground. Nine wickets are driven, five in a central row leading from post to post, and two others on each side. The game may be played by two persons. Each player is allowed to strike his ball once with the mallet, driving it along a line which makes the round of the wickets. If it pass through a wicket, he is entitled to play again, or if his ball strike that of an opponent, he is entitled to place his ball by the side of it and strike his own ball. This he aims to do in such a manner that his opponent's ball is rolled out of position, while his own comes in front of a wicket. He is then entitled to another play for his wicket, which won, he may again, if not in place, play his opponent's ball and thus continue. It is not at all impossible for a skillful player, with the aid of his opponent's ball, to make the entire round and strike his home post without giving his opponent an opportunity to stop his progress. Four can play to a still better advantage by pairing off. Those who play together assist each other. When a player cannot make a wicket he aims to leave his ball where it may be played upon by his partner; and likewise, when one player gets possession of his partner's ball, he aims by a split shot to throw it into position for a wicket and yet leave his own in an advantageous position. The game is in some respects like that of billiards. It calls for a firm wrist and a true eye. See Pall Mall.

Crosby, Fanny (1820-1915), the childhood name of Frances Jane Van Alstyne, a well-known American hymn writer, who was born at Southeast, N. Y. She became blind at the age of six months. When she was fifteen years old she entered the New York Institution for the Blind, and remained there for many years, both as pupil and as teacher of English and history. While in that position she married Alexander Van Alstyne, a blind pupil in the school. She was the author of many hymns, a number of which became very well known, and have attained an enduring popularity. The best known of these are *Safe in the Arms of Jesus* and *Jesus the Water of Life Will Give.* Most of her popular hymns are to be found in *Moody & Sankey's Gospel Hymns* and *Sankey's Sacred Songs and Solos.*

Cross, an ancient gibbet, consisting essentially of an upright piece and a cross-piece. It preceded the modern gallows, and was in common use among the Romans at the time of the crucifixion of Christ. There are several forms. The Latin Cross, or the cross of the crucifixion, consisted of a long upright beam, crossed by a transverse beam near the top. St. Andrew's cross has the form of an X. St. Anthony's cross has the form of the letter T. The Greek cross is like the Latin cross except that the four arms are of equal length. The Maltese cross consists of four triangular arms with their points to the center. See Crescent.

Cross, Mrs. Mary Ann Evans (1819-1880), an English novelist, best known by her pen name of George Eliot. She was born in a "small, low-roofed farmhouse" in Warwickshire, only thirty miles from Shakespeare's home at Stratford. Her mother was a woman of intelligence and force of character. Her father, Robert Evans, who had learned the trade of carpenter and builder, was a surveyor, as well as a farmer; and was land agent also to Sir Roger Newgate. Marian, as she was called among her friends, was a reader from her earliest childhood, but was not particularly fond of her lessons, until she reached the age of twelve, when she developed a desire for knowledge and a marked ability in its acquisition. At Coventry she came under relgious influ-

ences which tended to deepen her natural seriousness and conscientiousness.

When she was sixteen Marian's mother died, and she became her father's housekeeper. We might expect to find in the future novelist a dreamy, unpractical sort of girl, who would prove an indifferent housekeeper. On the contrary, she was neat, quick, and energetic—a good cook and a skillful needlewoman. Household duties did not hinder her from continuing her studies. This she was able to do more satisfactorily when, in 1841, her brother brought a wife to the old house, and father and daughter took up their abode in a new home near Coventry. Here she had several tutors. Her favorite studies were music and foreign languages, including French, German, Italian, Greek, and Latin. Hebrew she studied alone. Her reading covered a wide field.

Marian became intimate about this time with Charles Bray, his wife, Caroline Hennell, and her brother, Charles Hennell. These people were freethinkers, and were influential in leading Miss Evans to a decided change in her religious views. Strauss, a German theologian, completed the work these friends had begun. Miss Evans was occupied for two years in translating his *Life of Jesus* into English. In this work Strauss attempts to prove that the narratives of the New Testament are almost wholly mythical. In 1849 Mr. Evans died. Marian went abroad for a time and, on her return, visited London, living as a boarder in the house of John Chapman, editor of the *Westminster Review.* This association led to her accepting a position as assistant to Mr. Chapman, with which her literary career really began. Her special work for some time consisted of reviews of contemporary literature.

Miss Evans was at this time a delightful companion. She was musical, playing more than tolerably well; she was a charming conversationalist; and she was the most learned woman in England. Among other literary persons, she became acquainted with George H. Lewes. Her affiliation with him has been regarded as the one doubtful step in her life. It is but just to state that no one questions Miss Evans' conscientiousness. Mr. Lewes had been deserted by his wife. The technicalities of the English law made a divorce impossible. Miss Evans went to live with him, and, until his death, remained his faithful wife, and a loyal and devoted mother to his deserted children. Whatever may be said of the abstract morality of this step, two effects must be noted. It has injured her influence which, in every other respect, has been on the side of the highest type of morality. On the other hand, Mr. Lewes' influence on her literary career was most beneficial; so much so, in fact, that it is questionable whether, without it, her greatest work would have been produced.

Her first writing in the line of fiction was at his suggestion. *The Sad Fortunes of the Reverend Amos Barton,* the first story in her *Scenes of Clerical Life,* was sent to *Blackwood's Magazine* over the pseudonym of George Eliot, by which name the author was destined to be known henceforth. The other stories in the series soon followed. In 1859 *Adam Bede* was published. This work at once placed George Eliot's name with those of England's greatest novelists, Dickens and Thackeray. Other novels were produced in rapid succession. A complete list of her writings is as follows:

Life of Jesus (translation), 1846.
Essence of Christianity (translation), 1854
Scenes of Clerical Life, January, 1858.
Adam Bede, February 1, 1859.
The Mill on the Floss, April 4, 1860.
The Lifted Veil, 1860.
Silas Marner, March, 1861.
Romola, 1863.
Felix Holt, 1866.
The Spanish Gypsy (dramatic poem), 1868.
Address to Workmen, 1868.
Agatha, 1869.
How Lisa Loved the King, 1869.
Middlemarch, 1871-2.
The Legend of Jubal, and other poems, May, 1874.
Daniel Deronda, 1876.
The Impressions of Theophrastus Such, 1879.

The identity of George Eliot had been kept a secret from the reading public, and even from the editor of *Blackwood's,* until after the publication of *Adam Bede.* The credit of the stories being given to another, who was either unable or unwilling to set people right in the matter,

made it necessary for the author to disclose herself. In 1878 Mr. Lewes died. A year and a half later, Mrs. Lewes married John Walter Cross, a London banker some twenty years her junior. Her death occurred quite suddenly in 1880.

George Eliot's life was externally quiet and uneventful. Her inner life, we can scarcely doubt, was sufficiently exciting. Life itself was a serious matter with her. Her views of life, her religion, her friendships, her human relations,—all stirred her profoundly. Personally, she was a rather small, homely woman, with a large, strong-featured, yet gentle face. Frederick Myers speaks of "her grave, majestic countenance." She was quiet, almost timid in bearing, with a refined, sympathetic voice, a quickness and clearness of thought, and a gift of expression which made her society unusually fascinating. She was by nature of a religious temperament; but so logical of mind that faith without sight was almost an impossibility. Reared in the Church of England, she was converted, at the age when most susceptible to religious impressions, to the views of the "Dissenters," as the Methodists and Baptists were called. Conscientious in her views to an extreme, but coming under the influence of skepticism before her character was formed or her intellectual powers fully developed, it would seem that the agnostic views to which she adhered throughout life were inevitable. She showed, however, a profound respect for all religious feeling and belief in others. No other writer of fiction has treated religion with greater respect, delicacy, and appreciation of truth in different forms. In *Adam Bede,* Methodism; in *Romola,* Catholicism; in *Daniel Deronda,* Judaism—in all she makes clear that to her the religious emotion,—not the religious creed,—is the real and vital truth.

Mr. Cross, her husband and biographer, says of her that "she showed from her earliest years the trait that was most marked in her through life,—namely the absolute need of some one person who should be all in all to her, and to whom she should be all in all." Knowing this trait of her nature, her life story is made clearer. In her earliest childhood she had her brother Isaac. The story of the childhood of Tom and Maggie Tulliver in *The Mill on the Floss* is said to be a true picture of the early years of Isaac and Marian Evans. Then she had her father. Just before his death she wrote, "What shall I be without my father? It will seem as if a part of my moral nature were gone." Again she leaned upon Mr. Lewes and found in him the human sympathy and support she craved. Her marriage to Mr. Cross so soon after her first husband's death came as a shock to many of her friends. But her nature demanded this human companionship and would not be denied.

In intellectual power George Eliot is often regarded as masculine, so virile were her reasoning faculties; so vigorous and free from prejudice her judgments; so philosophic the general trend of her thought. In character she was essentially feminine, affectionate, proud, sensitive; easily moved to tears or laughter; intense in her enjoyments and sorrows. To this union of the masculine and feminine is due much of her power as a writer of fiction.

George Eliot's novels are divided usually into two groups. The first four in the list are based on circumstances coming under the author's own observation during her early life in Warwickshire. The other and later novels belong to the second class, and are based upon certain special studies. *Romola,* one of the world's great novels, is a picture of Florentine life during the fifteenth century. The material for *Felix Holt,* which is a claim for political equality, was obtained from files of old newspapers. For *Middlemarch,* a rather tedious picture of life, although literary critics often call it her greatest work, studies were made of medical treatises and medical colleges. In *Daniel Deronda,* a study of Judaism, the treatment accorded the Jew by the Christian furnishes the theme.

There is a diversity of opinion as to which of George Eliot's novels should be regarded as the greatest. *Silas Marner* is the favorite usually with young people. It is the simplest, and yet the most perfect in

execution. *Adam Bede* has attracted, doubtless, the largest number of readers. *Romola, Middlemarch, Daniel Deronda,* —each is defended for first place by a band of admirers.

George Eliot as a novelist is placed frequently ahead of both Dickens and Thackeray. Judged by the standards of the modern critic this is perhaps just. She shows a greater power in the analysis and development of character than either. She is more accurate, and is possessed of wider and more varied culture. Above all, her insight into the spiritual life of men and women surpasses that of any other novelist. Judged, however, by the standards of the average reader of novels, George Eliot's philosophy is too somber, especially in her later novels; her analysis of character becomes too minute,—the story is almost lost in psychological problems. Thackeray is more amusing; Dickens leaves the reader happier. From first to last, however, George Eliot's novels present the highest moral standards. They teach the sovereignty of duty; the rewards of unflagging endeavor; the heroism of commonplace, everyday life, where selfish motives are lost sight of for the universal good.

MARY BLANCHARD MURPHY.

SAYINGS.

It is hard to be wise on an empty stomach.

It's easy finding reasons why other people should be patient.

I've never any pity for conceited people, because I think they carry their comfort about with them.

When Death, the great reconciler, has come, it is never our tenderness that we repent of, but our severity.

Th' young men nooadeys, th're poor squashy things,—the' looks weel enoof, but the' woon't wear, the' woon't wear.

Speculative truth begins to appear but a shadow of individual minds. Agreement between intellects seems unattainable, and we turn to the truth of feeling as the only universal bond of union.

It is never too late to be what you might have been.

My books are deeply serious things to me, and come out of all the painful discipline, all the most hardly learnt lessons of my past life.

The only effect I ardently long to produce by my writings is, that those who read them should be better able to imagine and to feel the pains and the joys of those who differ from themselves in everything but the broad fact of being struggling, erring, human creatures.

O may I join the choir invisible
Of those immortal dead who live again
In minds made better by their presence; live
In pulses stirred to generosity,
In deeds of daring rectitude, in scorn
For miserable aims that end with self,
In thoughts sublime that pierce the night like stars,
And with their mild persistence urge man's search
To vaster issues.

SAID OF GEORGE ELIOT.

Her conversation was deeply sympathetic, but grave and solemn, illumined by happy phrases and by thrilling tenderness, but not by humor. Although her features were heavy and not well proportioned, all was forgotten when that majestic head bent slowly down, and the eyes were lit up with a penetrating and lively gaze. She appeared much greater than her books. Her ability seemed to shrink beside her moral grandeur.—Oscar Browning.

A large intelligence was her dominant characteristic. However keenly she might feel, she could always see more keenly still. She not only had the creative imagination which brought forth these children of her brain; she had the piercing gift of analysis as well. So that more than any other English novelist, when her characters were once born, she had the power of probing to the quick all their secret impulses and springs of action.

In a word, the difference between Dickens's and George Eliot's powers is here typified: Dickens tends toward the satiric or destructive view of the old times; George Eliot, with an even more burning intolerance of the essential evil, takes on the other hand the loving or constructive view. It is for this reason that George Eliot's work, as a whole, is so much finer than some of Dickens's. The great artist never can work in haste, never in malice, never in even the sub-acid, satiric mood of Thackeray: in love, and love only, can great work, work that not only pulls down but builds up, be done; it is love, and love only, that is truly constructive in art.—Sidney Lanier.

George Eliot shows man what he may be, in terms of what he is.—Sidney Lanier.

Crossbill, a bird of the finch or sparrow family. The red or American crossbill is an inhabitant of evergreen forests from the Carolinas northward. The male is of a dull red color, with brown wings and tail. The female is of a dull olive green. The name comes from an apparent deformity of the bill. One tip turns to the right, the other to the left—a peculiar arrangement, which, combined with an

ability to move the tips laterally, enables the bird to spread the scales of pine or other cones in search of the seed within. It is a bird of the north. Its home is in the great coniferous forests. It nests about twenty feet from the ground. There is also a white-winged crossbill, and there are a number of Old World species. See SPARROW.

Cross Buns, small cakes prepared especially for Good Friday. They were appropriately marked with the sign of the cross, hence the name. They were always a popular feature of the English Lent, and some attempt has been made to revive their use in this country. The origin of the practice of serving cross buns is thought to be rooted in some heathen practice long forgotten. Chambers states that at Chelsea there were formerly two celebrated bun houses, besieged on Good Friday, both morning and night, by eager purchasers.

Cross-Fertilization, in botany and horticulture, the fertilization of the ovules of one plant by pollen from another plant. Darwin, the investigator of fertilization, claims that plants raised from cuttings of the same parent, as potato plants raised from parts of the same potato, are practically the same plant, and that true cross-fertilization can be secured only when the pollen and the ovules belong to plants raised from seeds.

In many plants the pistils are ready for pollen before or else after the pollen of the same plant is ready to fall. In this case the pistil may receive pollen brought by the wind from another plant, perhaps miles away. Some flowers are so peculiarly constructed that there is no opportunity for the pollen to come in contact with the pistil. In this case the pistil depends on pollen brought to it by the legs of bees and other insects in search of sweets. In the case of the pea family the anthers so envelop the style of the pistil that cross-fertilization is unlikely to occur. The wind and insects are the chief agencies of cross-fertilization. Plant breeders protect the pistil from wind and insect by paper bags, and powder with pollen from the particular plant desired. Darwin established the principle that seeds obtained by cross-fertilization are more vigorous, and produce stronger plants, than seeds obtained by close-fertilization. There are, of course, exceptions to the rule. He experimented with the common morning glory. He found that cross-fertilization and close-fertilization for one generation gave plants having average heights of 100 and 76 respectively; the fifth generation gave 100 and 75. Seeds produced by ten successive cross-fertilizations, and seeds produced by ten successive close-fertilizations produced plants having heights of 100 and 54 respectively. If the prevailing wind be from the west when pollen is flying, it is evident that a row of corn on the west side of a field must be close-fertilized, or not at all. Under the same wind conditions, the east row has slight chance of close-fertilization; but the silk is likely to catch pollen from tassels growing in rows further west. Windy weather favors cross-fertilization. The skillful corn breeder chooses his seed from rows that are likely to be cross-fertilized.

The beneficial effect of cross-fertilization upon morning glories and corn has been described. On the other hand, close-fertilization or inbreeding is best for some plants. Experiments with tobacco, for instance, have convinced growers that the best seed may be obtained by tying paper bags over the whole flower stalk in such a way as to shut out insects and exclude pollen carried by the wind. Seed obtained in this way is heavier, and produces not only more vigorous, but more uniform plants than seed obtained by miscellaneous cross-fertilization.

Croton Bug. See COCKROACH.

Croup, a name applied to two quite distinct diseases of childhood. True croup, or membranous croup, is in reality diphtheria of the larynx and adjacent parts. It is a dangerous disease and demands the immediate attention of a physician. False croup, the variety which is meant commonly when the word croup is used, is a catarrhal affection of the larynx. It comes on suddenly at night, the child awaking with a harsh, discordant cough accompanied by difficulty in breathing so great as to be terrifying to an onlooker. Unless it is

known that the child is subject to false croup a physician should be called to diagnose the case. If assured that the trouble is nothing more dangerous than common croup, the treatment is simple. If vomiting be induced, relief is almost sure to follow. Breathing steam, as from a pitcher of boiling water, is helpful. In croup as in many other diseases, however, prevention is better than cure. The trouble is a result frequently of exposure to wet and cold, and a child who is kept warm and dry if otherwise healthy will seldom have croup. In case of unavoidable exposure the child for whom croup is feared should be thoroughly warmed before he is put to bed. The entire chest should be bathed in warm water, dried, and thoroughly rubbed with camphorated oil, or some similar ointment. In most cases this will ward off an attack.

Crow blackbird.

Crow, a family of birds which includes the jay and the raven. There are said to be two hundred species. The crow is proverbially black. The common crow nests from Mexico to Hudson Bay, retiring into the southern half of its range in winter. It builds in a tree a bulky nest of twigs, strings, shreds of grapevine, leaves, grasses, and moss, from twenty to thirty feet up. Eggs, four to six, bluish green, often mixed with shades of brown. The crow is nearly twenty inches in length. Were it not for his determination to have all the seed corn when planted, and a heavy rental when the corn is mature, the crow's natural diet of insects, seeds, snails, grubs, and caterpillars would cause the farmer no uneasiness.

The crow is a wary bird. A flock of crows feeds always in charge of a sentinel, at whose warning caw there is no delay in winging to a place of safety. Apparently familiar and bold, the crow learned, generations since, to tell the difference between a man and a man with a gun; yet it is often imposed upon and kept away from a cornfield by a scarecrow hat and an old hay-stuffed coat ingeniously disposed on a pole. It is said that a crow can count as far as three; for if three persons enter a cornfield to lie in wait with guns the crows will remain in distant tree-tops till three persons have gone out again; but that, if the number of persons who enter in a group exceeds three, the crows lose count and approach the corn after three persons have gone away.

The self assured *kaw, kaw, kaw,* of the crow, when it has nothing to fear, is capable of considerable variation; and ingenious argument has been expended to prove that the crows have an intelligible though limited vocabulary. Some claim to have taught crows to talk. When on a journey, or when flying between its roost and feeding ground, the crow takes a straight course; which has passed into the convenient expression of distance measured "as the crow flies." Lowell emphasizes the delights of early summer with a characteristic, "The crows flapped over by twos and threes." In winter the northern crows go south and gather together in large roosts, some of which Mr. Rhoads, writing in the *American Naturalist,* has estimated as containing over 300.000 birds.

A disagreeable habit of devouring the eggs of small birds has left the crow few feathered friends, but it seems to thrive under modern conditions. "I have seen no bird walk the ground with just the same air the crow does. It is not exactly pride; there is no strut or swagger in it, though perhaps just a little condescension; it is the contented, complaisant, and self-possessed gait of a lord over his domains. All these acres are mine, he says, and all these crops; men plow and sow for me, and I stay here or go there, and find life sweet and good wherever I am. The crow is a character I would not willingly miss from the landscape," says Burroughs.

The Florida crow is a smaller southern species of the pine woods. The fish crow is smaller than the common crow and, if there be any difference, blacker. It is no fonder of seashore winter diet than its relatives, but is seldom found far inland. With the exception of black in its wings and tail, the Clark crow is white. It nests in the high pine trees of the Rocky Mountains. British species are the rook, the jackdaw, the carrion crow, and the chough.

See JAY.

Crow Blackbird. See BLACKBIRD.

Crowder, Enoch Herbert (1859-), an American army officer, was born in Missouri, and was educated at the United States Military Academy. In 1895 he was appointed major judge advocate, and during 1898-1901 he saw service in the Philippine Islands. In 1904-05 General Crowder was observer with the Japanese Manchurian forces, was Secretary of State and Justice in Cuba in 1906-08, and in 1917-19 was provost-marshal general.

As chief of the conscription bureau of the United States during the World War, General Crowder enhanced his reputation for ability, and when the war closed he was reappointed judge-advocate general. In 1919 the Cuban government called upon General Crowder for advice in connection with the changes in election legislation in the Republic. In his *Spirit of the Selective Service* General Crowder has described in detail the methods used in mobilizing American troops for the World War.

Crow Indians. See DAKOTA.

Crown, a circlet worn on the head as an ornamental mark of honor, or emblem of authority. The Greek crown placed on the head of the victor in the national games consisted of a garland of laurel. The Romans bestowed a number of crowns,—a garland of wild flowers on the general who relieved a beleaguered garrison; a garland of oak leaves and acorns on him who saved the life of a Roman citizen in battle; and a golden band surmounted by miniature turrets on the first to scale the walls of the enemy. The Roman bride wore a garland of flowers of her own plucking and weaving.

The crown of authority of sovereignty is supposed to be derived from the diadem of the Persians. Alexander the Great wore a crown. Charlemagne was crowned with the iron crown of the Lombards. His imperial crown of heavy, pure gold, adorned with hundreds of large, uncut precious gems, and ornamented with inscriptions and enamels, is kept at Vienna. The triple crown of the pope is called his tiara. The royal crown of Great Britain consists of a band of gold enriched with precious stones and pearls, and heightened by four Maltese crosses alternating with fleur de lis. Imperial arches spring from the crosses, uniting under a mound, above which rises a jeweled cross. The heir to the throne, royalty of each degree, and earls are entitled to wear coronets.

The term crown is used also in the sense of royal authority and the state. Thus the English speak of the prerogative of the crown, crown lands, crown ministers, crown lawyers, crown officers. Crimes, which in this country are called offenses against the state, are in the United Kingdom offenses against the crown. The governor-general of Canada is said to be appointed by the crown.

Crown. See MONEY.

Crowninshield, Arent Schuyler (1843-1908), an American naval officer, was born at Seneca Falls, New York. He was a graduate of the United States Naval Academy, and took part in the attacks on Fort Fisher in 1864 and 1865. In 1868 he rose to the rank of lieutenant-commander. He became commander in 1880 and captain

in 1894. He was chief of the Bureau of Navigation in 1902, and during the Spanish-American War was a member of the Board of Naval Strategy. As commander of the battleship Maine he immediately preceded Capt. C. D. Sigsbee. He was retired in 1903.

Crowninshield, Frederick (1845-), an American artist and writer. He was born in Boston, and graduated at Harvard in 1866, and later studied in London, Italy and Paris. He returned to the United States and became instructor in the Boston Art School, and later, upon removing to New York, was president of the Fine Arts Federation for 9 years. In 1911 he was appointed director of the American Academy at Rome.

Crowninshield specialized in mural decorations, and was signally successful in color schemes, arrangement and design of borders and arabesques and in stained glass windows and his work materially established this branch of his art in the United States. Among his books are *Mural Painting,* a *Painter's Moods* and *Tales in Metre.*

Crown Jewels. See TOWER OF LONDON.

Crown Point, N. Y., is situated on the west shore of Lake Champlain, and on the Barge Canal, 110 miles northeast of Albany. The site of the present town was first visited by Champlain, who here fought and defeated the Iroquois Indians. In 1714, it became an English trading station. In 1731, the French built upon the site Fort St. Frederic, which they held until 1759, when it was partly destroyed. Lord Jeffrey Amherst took possession of the remains of the fort in 1759, and in the winter of 1759-1760 he began the erection of Fortress Crown Point, the ruins of which still remain. In 1775, Seth Warner, leading a band of "Green Mountain Boys," took the fort from the English. The present town is several miles from the site of the old fort. The grounds containing the ruins of Fort St. Frederic and Fortress Crown Point were presented to New York State for a public park in 1910. In the town are manufactured sashes and doors, stoves, building materials and creamery products. The population in 1920 was 1,900.

Crucifix. See CROSS.

Cruickshank, Ernest Alexander (1854-), a Canadian historical and military writer, was born in Welland County, Ontario, and educated at Upper Canada College. After engaging in newspaper work in the United States, he returned to Ontario, and in 1886 became warden of Welland County, in 1903 police magistrate at Niagara Falls, Ontario, and in 1908 military archivist at Ottawa. From 1899 to 1904 he was lieutenant colonel commanding the Forty-fourth Regiment of Militia, afterward being appointed a district officer, commanding. He was elected a fellow of the Royal Society of Canada in 1907.

He has written many books on historical and military topics, among which are: *Battle of Lundy's Lane* (3d ed. 1894); *Battle of Queenston Heights; Battlefields of the Niagara Peninsula; A Century of Municipal History; Battle of Fort George; and Documentary History of the Campaigns on the Niagara Frontier in 1812-14.*

Cruikshank, krŏŏk'shank, **George** (1792-1878), an English caricaturist and artist. He was a native of London. When a child poverty prevented him from gaining a general education. Throughout his life he showed ability but want of culture. At the age of fifteen he was known as an illustrator of children's books. Fame was achieved by a series of etchings made for *Bentley's Miscellany* in 1837 to accompany *Oliver Twist,* then running in serial form. *The Bottle,* a series of eight large plates, represents the various stages of drunkenness in a style worthy of Hogarth. *Tam O'Shanter, The Merry Wives of Windsor, Punch and Judy, Boz,* the *Comic Almanac,* and many other subjects afforded opportunity for humorous sketches. The British museum is the fortunate possessor of over 5,000 sketches by this humorist. While he did not create types, like the G. O. P. or Uncle Sam of Nast, it may be said that few artists have done more to ridicule vice and purify the public taste than he. See NAST; CARICATURE.

Crusades, a long struggle between Christian Europe and Mohammedan Asia for the possession of the Holy Sepulcher, or burial place of Christ. It lasted from

1100 to 1300. The several spasmodic movements of greatest force are known as The Eight Crusades. In an age when a pilgrimage to a shrine was the accepted way to win sanctity, forgiveness, or health, a pilgrimage to the tomb of Christ at Jerusalem was the holiest of all good works. The Canterbury pilgrimage described by Chaucer is but an incident compared with the stream of pilgrims pouring into Palestine. In 1064, for example, a single company, setting out under the leadership of the Archbishop of Mainz, numbered 7,000 men. The Saracens, that is to say, the Arabs, in possession of the Holy Land, welcomed the pilgrim as a source of revenue; but the Turks who captured Jerusalem in 1076, though of the same religion as the Arabs, began to persecute the Christian travelers.

A tremendous excitement ensued. Pope Urban convened a council. Fired by his eloquence, the multitude broke out into a frenzy of enthusiasm. "God wills it, God wills it," was the cry. A holy war was proclaimed against the infidels. The ambitious, the pious, the criminal, the needy, and the adventurous all found opportunity. The Knights of St. John, the Templars, and the Teutonic Order were all organized during this period. Immense hordes of Europeans were precipitated upon Asia Minor and Syria. In 1099 the Christians obtained possession of Jerusalem. Four brief European kingdoms were set up in Asia, but under Saladin the Moslems retook the Holy City.

Among the many expeditions was the Children's Crusade, about 1212, instigated by the wild preaching of the times. Upwards of 20,000 German children and 30,000 French, both boys and girls, reinforced by bands from England and other countries of Europe, made their way on foot to Marseilles, Genoa, and to the Mediterranean ports. They expected the waters to part for them, as did the Red Sea before the children of Israel. Many were taken on board ships and conveyed to far-off shores where they were sold as slaves. Others were conveyed to the Holy Land. Large bands made their way overland into the territory of the Turks, where they were slaughtered without mercy or were sold into slavery. Of the vast number of children that set out to rescue the tomb of Christ, a mere remnant of 700 was rescued from the infidels, seventeen years later, by Frederick II. Movements like these seem incredible. They remind the reader of the migrations of lemmings from the forests of Scandinavia to the sea. They resulted in the loss of thousands, possibly of millions of lives, with no compensating benefit.

The Third Crusade, led by Frederick Barbarossa, Philip II of France, and Richard the Lionhearted of England, is the most noted; but through jealousies it accomplished perhaps the least. So far as political changes go the Crusades bore no result. The Turks fastened their grip on the Levant and hold it to this day. The civilization of Syria has been crushed out, but the Europeans learned much. Intensely as they despised the Turk, they learned to respect the Arab, and brought home many new notions. The commercial importance of Venice and Genoa was greatly increased. The Crusaders acquired a taste for the products of eastern lands. The spices, sugar, dates, melons, and apricots of the East became known in the West. Cotton, silk, calico, rugs, satins, velvets, muslins, and damasks were introduced. The use of various eastern oils, perfumes, and dyes began. The Crusaders learned how to build looms, windmills, and how to make glass. Venice and Genoa became great commercial cities and manufactories sprang up. The coarse manners of western Europe were refined, and the people became more intelligent. It is much to be regretted that the period of Crusades did not accomplish more for the Levant, and that it did not result in driving the debasing Turk out of Europe and western Asia, but the effect on western Europe was excellent. The best picture in literature is given in William Stearns Davis' novel, *God Wills It.*

See JERUSALEM; SARACENS; WINDMILLS; RICHARD I; PETER THE HERMIT; LEMMING.

Crusoe, Robinson, a character in an interesting story of the same name. See DEFOE; SELKIRK.

Crystal Palace, a building erected at Sydenham, a southern suburb of London, in 1854. It was built of materials from the buildings of the great exhibition of 1851. The name is derived from the great quantity of glass used in the construction. The building is 1,600 feet long, 380 feet wide, and 200 feet high at the center. It cost about $4,500,000. It is now devoted to sculpture, architecture, painting, natural history, fossils, and manufactured articles. The building is surrounded by grounds, comprising 200 acres, adorned with trees, walks, statues, fountains, and flower gardens. The whole constitutes an instructive combination of park and museum. See SKYSCRAPER.

Crystallography, the part of natural science having to do with crystals, the solids with plane surfaces into which all inorganic substances when solidifying tend to arrange themselves. Though these forms are almost innumerable, they naturally fall into six classes, determined by the relation of their axes:

1. The Regular or Cubical, called also Isometric, with three equal axes at right angles, as common salt, or galena.

2. The Tetragonal or Dimetric, with axes at right angles and with one longer or shorter than the others, as yellow prussiate of potash.

3. The Orthorhombic, or Trimetric, with axes all unequal but still at right angles, as saltpeter, or sulphur.

4. The Monoclinic, with one inclined axis, as in borax, or copperas.

5. The Triclinic, with all axes oblique, as in copper sulphate.

6. The Hexagonal with three axes in the same plane, at angles of 60° and a fourth at right angles to this plane, as in some varieties of limestone.

Cuba, the largest of the West India Islands. It is the largest fertile island in America. It lies between Florida and the Caribbean Sea, guarding the entrance to the Gulf of Mexico. At its nearest approach it is less than a hundred miles from Key West, the extreme island of Florida. It is shaped "like the extended tongue of a woodpecker with a barb on the southern side of the ocean end." The greatest length following the main curve is about 800 miles. The width varies from 100 to 25 miles. Its area is 44,000 square miles, slightly surpassed in size by Pennsylvania.

CLIMATE AND PRODUCTS. The interior of Cuba is mountainous, save that plains follow one or two of the rivers. The highest peak reaches 8,600 feet. The rivers are short and rapid. A number plunge through beautiful white limestone caverns. The coast is indented by deep, safe harbors. There are several hundred small islets about the coast. The climate is moist and, save in the mountains, torrid. The soil is rich. Nearly one-half of the total area is under cultivation. Cuba, Ceylon and Java not excepted, is the most productive island in the world. It leads the world in the cultivation of sugar-cane and tobacco. In some years it produces half the world's sugar. Cuban tobacco fetches a high price in the market. Bananas, oranges and lemons, pineapples, and figs flourish. Coffee and cotton are well suited to the climate and soil. Nearly one-half of the island is yet in forests, yielding cedar, ebony, lignum vitae, mahogany, pine, rosewood, and several dyewoods. The island has mineral wealth. Copper mines have been worked since 1524. Silver, lead, and iron are found in paying quantities. Soft coal, shading off into asphaltum. is abundant.

HISTORY. Cuba was occupied by the Spaniards nearly a century before a permanent English colony had been planted on the Atlantic coast of the United States. In 1519, though not the first settlement, Havana was founded. It is situated on a fine harbor on the northern coast. Morro Castle at the entrance was fortified in 1600. The harbor with its fort was regarded as "the key to the New World." Cuba became a source of revenue to Spain. When the South American countries threw off the yoke of Spain in 1820 the "ever faithful island" remained loyal, but later became dissatisfied with oppressive regulations, especially an act in 1825 placing Cuban lives and fortunes under the absolute rule of a military commander.

Frequent uprisings were followed by cruel tortures and executions. During the

greatest of the outbreaks, 40,000 Cuban lives were lost and over 200,000 Spanish soldiers were carried away by yellow fever. The cost of this Cuban insurrection, including the loss of property, was reckoned at $300,000,000. At this time the South American Republics were anti-slavery. It was feared that independent Cuba would free her slaves. It has been charged that the pro-slavery interests of the United States prevented our helping Cuba to independence. On the other hand, the anti-slavery sentiment in the United States opposed the annexation of Cuba, because it would be admitted doubtless as a slave-holding state. So the "Gem of the Antilles" had no help from the United States, and the Spaniards were left free to wreak their vengeance on the leaders of one outbreak after another, and to continue the work of reducing one of the richest regions of the world into a jungle.

In 1895 a last and a successful uprising took place. The sympathies of the United States were with the Cubans. An American warship, the Maine, in the harbor of Havana, was blown up supposedly by a mine. The United States declared war in behalf of the Cubans. "Remember the Maine!" became the watchword. American troops, including the Rough Riders under Roosevelt, invaded the island. The American navy blockaded the ports, and Spain was forced to grant Cuban independence.

Government and Population. At the close of the war the island was organized as a republic. A constitution resembling that of the United States, but with peculiar clauses authorizing the United States to act as its sponsor and defender in the eyes of the world, was adopted February 21, 1901. Owing to disturbances it was necessary for the United States to intervene again; but in 1908 our troops again left Cuban soil, and since then the Cubans have governed themselves. There are six provinces, with a total population in 1919 of 2,898,905, one quarter of which is colored. Each province has a capital town of the same name. Havana, opposite Key West, is the chief city,—the capital of the nation. Its population is about 363,506. Santiago, opposite Jamaica, is the second city in importance. Spanish is the official language. The predominant religion is Catholic.

Trade and Commerce. The close of the wars for independence found Cuba poor and depopulated. The United States gave aid in the last war, but requires Cuban products to pay so high a tariff on entering the United States that the industries of the country have recovered less rapidly than was hoped. Nearly half of the Cuban purchases and three-fourths of the sales are made in the United States. The chief exports are sugar, rum, molasses, tobacco, cigars, bananas, pineapples, oranges, lemons, tomatoes, potatoes, sweet potatoes, peppers, eggplant, okra, cocoanuts, figs, mangoes, mahogany, cedar, sponges, shells, horns, hides, hoofs, honey, and wax.

Much progress has recently been made. The plantations have a less neglected look. One may now travel the length of the island by rail. Towns and cities have been placed in a more sanitary condition.

Statistics. The following are the latest reliable statistics to be had:

Area, square miles	44,215
Population (1919)	2,898,905
Chief Cities:	
Havana	363,506
Camaguey	98,193
Cienfuegos	95,865
Santiago de Cuba	70,232
Guantanamo	68,883
Matanzas	62,638
Number of provinces	6
Members of senate	24
Members of house of representatives	118
National revenue	$90,000,000
Bonded indebtedness	$88,306,000
Farm area, acres	28,299,000
Tobacco, value	$33,829,627
Sugar cane, short tons	4,408,365
Honey, gallons	185,091,864
Domestic Animals:	
Horses	779,496
Cattle	3,965,000
Mules	64,570
Manufacturing establishments	314
Capital invested	$229,662,500
Iron ore, tons annually	200,000
Rum, gallons	11,489,718
Alcohol, gallons	5,778,147
Imports	$315,587,167
Exports	$477,221,863
Miles of railway	3,200
Teachers in public schools	6,151
Pupils enrolled	334,671

Cubeb, a climbing shrub of Java, New Guinea, and adjacent islands. It is closely

related to the peppers. When dried its berries resemble black pepper, except that they have short stems or stalks. Cubebs are administered for a number of ailments, and are smoked as a remedy for catarrh and asthma. See PEPPER; MEDICINE.

Cuckoo, a family of birds allied in some respects to the woodpecker. There are well on toward two hundred species of cuckoos, and thirty-five are found in the New World. Two toes are directed forward and two backward after the manner of woodpeckers, but the cuckoos use their feet for grasping limbs rather than for climbing. The cuckoo of literature is a widely diffused bird, found in the northern part of the Old World in summer, and in India and northern Africa in winter. In England and temperate Europe its well known note is the harbinger of spring.

The cuckoo is a grayish bird about fourteen inches in length. It lays an egg no larger than that of the skylark, and has incurred a bad reputation by neglecting to build a nest of its own. Single eggs are deposited stealthily in the nests of small birds to be hatched by hedge sparrows, wagtails, skylarks, robins, thrushes, and buntings. The young cuckoo is all greed and appetite. It soon shoulders its foster brothers and sisters out of their own nest. The foster parents, the owners of the nest, work untiringly in their frantic attempts to keep its crying mouth full of worms. As soon as able to fly, it goes off and leaves them. The young cuckoo, therefore, though deserted by its own parents, is the type of ingratitude.

Although outranked by the skylark and the nightingale, the cuckoo was one of the earliest songsters to attract the attention of English poets, because of its mysterious life. The following bit of lyric is of unknown date and authorship, but it precedes Chaucer by some centuries. With modernized spelling it runs as follows:

Summer is a-coming too,
Loud sings cuckoo.
Groweth seed and bloweth mead
And springeth the wood new,
Sing cuckoo, cuckoo.

The red-billed and the yellow-billed American cuckoos have better manners than their British cousin. They breed throughout the eastern part of North America and winter in the tropics. Both

Yellow-billed cuckoo.

lay from three to five greenish eggs in nests, usually resembling those of a dove, and feed their own young, chiefly with caterpillars.

Many German homes contain specimens of the famous cuckoo clock. In place of striking, a clever imitation of the cuckoo calls the hour.

Cucumber, with squashes and melons, a member of the gourd family. The garden cucumber is native to southern Asia, but is cultivated in gardens as far north as the center of England. Of late the market demand for fresh cucumbers has led to the investment of money in forcing houses in which cucumber vines are trained to run on frames beneath a glass roof. The cucumbers hang down from the vines in easy reach. A small house will raise a surprisingly large number of cucumbers for winter and spring market. Garden cucumbers require a rich, sunny spot. Seed should not be spared, as the young plants are especially subject to the attacks of in-

sects. The plant stops yielding as soon as a few cucumbers are allowed to turn yellow. Young cucumbers may be put down in brine for salt pickles, and later the salt may be soaked out and the cucumbers placed in vinegar for sour pickles. Gherkins are a small kind of cucumber suitable for pickles. See GOURD; VEGETABLES.

Cud Chewers, or **Ruminants,** an order of quadrupeds. All ruminants have a singular faculty of chewing the cud. They gather their food, chiefly grasses, herbs, or twigs, hastily. Ruminants have four stomachs. In swallowing they are able to admit food into either stomach at will. The first stomach is called the paunch. It receives vegetable matter, bruised at a first chewing. From the paunch food passes into the second or honeycomb bag, a small globular stomach, which seizes the food, moistens it, and presses it into little pellets or cuds. After gathering food for a time, the animal lies down or stands at rest, and raises these cuds into its mouth, and chews them in great apparent contentment. Food thus re-chewed descends into the third stomach, from which it proceeds to the fourth stomach, where true digestion takes place. In the young ruminants the fourth stomach is the largest of the four, so long as they continue to live on milk. The paunch is developed by pasturage. By chewing the cud an ox extracts about ten or twelve per cent more food from dry hay than a horse does. Cud chewers are divided into four families.

1. The ox family.
   a. Domestic cattle.
   b. The goat kind.
   c. The sheep kind.
   d. The antelopes.
2. The giraffe family.
3. The deer family.
4. The camel family.

Cuirass. See ARMOR.

Culloden, kŭl-lō′den, a battlefield in the Highlands of Scotland, four miles east of Inverness. Here, April 27, 1746, Charles the Pretender and his Highland adherents made the last stand of the Stuarts. They were scattered to the four winds by the English Duke of Cumberland. Charles lay in hiding for weeks until he had opportunity to escape to France. He made no further attempt to secure the British crown. For the Highlanders the day was one of disaster. Hundreds of their fighting men lay slain on the heath, and the coronach or wail for the dead was heard in every glen and mountain fastness. A monumental cairn marks the spot of the battle. See SCOTLAND.

Cullom, Shelby Moore (1829-1914), an American statesman, was born in Wayne County, Kentucky. At the age of 26 he began the practice of law at Springfield, Illinois, and became an active leader in politics in that state. He was soon elected to the legislature, where he served several terms. From 1865 to 1871 he represented his district in Congress. Mr. Cullom was a delegate to the Republican Convention in 1872, and placed Grant in nomination. From 1876 to 1883 he was governor of Illinois. In the latter year he entered the United States Senate, being reelected for five consecutive terms. In 1913 Senator Cullom was appointed commissioner in charge of the Lincoln Memorial at Washington, D. C., and made the arrangements for the beautiful structure on the banks of the Potomac near Washington.

Senator Cullom was the author of the Interstate Commerce Law and for many years served as chairman of the Senate committee on Interstate Commerce, and in 1898 he was a member of the commission to establish American government in Hawaii. He wrote *Fifty Years of Public Service,* in which his public work is fittingly summarized.

Cumaean Sibyl. See SIBYLS.

Cumberland, Md., a manufacturing city, is finely situated on the Potomac River, 152 miles northwest of Washington, D. C. It is the county seat of Alleghany County. The city was laid out in 1785 on the site of Fort Cumberland, built in the winter of 1754-1755, at the outbreak of the French and Indian War.. It is a shipping point for much of the coal mined in the important Cumberland and George's Creek coal field, 11 miles distant. It contains extensive rolling mills for the manufacture of railroad building materials, together with steel shafting works, iron foundries, tin

plate mills and glass works. It was the first city in Maryland to adopt the commission form of government, 1909. It has a fine public school system, and the water works and electric light plant are municipally owned. Population, in 1920, 29,837.

Cumberland Mountains, a part of a range of the Appalachian system; they rarely exceed 2,000 feet in height. The elevations are highest in Kentucky, and descend gradually to the west and south. The rocks at the surface are formed of limestone, sandstone and slate, and these contain coal deposits. The mountains are covered with timber, such as hickory, ash and chestnut, but the soil is not rich. The slopes drain into the Ohio River, by the Cumberland and Tennessee rivers.

Cumberland River, a river 688 miles in length that rises in the Cumberland Mountains of Kentucky, flows westward into Tennessee, doubles upon its course and flows back into Kentucky, emptying into the Ohio River at Smithland. The river is navigable for 193 miles on its lower course, or to Nashville, Tennessee; while, when conditions permit, light craft ascend the river as far as Burnside, Kentucky, a distance of 580 miles from the river's mouth. At the Great Falls, in Whitley County, Kentucky, the Cumberland River makes a sharp descent of 63 feet and below these falls rushes in a series of rapids, known as the Great Shoals, for a distance of 10 miles.

Cumberland Road, a great national highway. It was projected in 1806 in Jefferson's administration on the model of the great Roman roads. It was intended at first to run from Baltimore to the Ohio and was afterward extended. Between 1806 and 1840 the general government expended nearly $7,000,000 in laying out, grading, building bridges, and macadamizing. The road ran from Baltimore westward through Fredericksburg, Cumberland, and Wheeling; through Ohio to Vandalia, Illinois—800 miles in all—where further construction was abandoned as unnecessary on account of the building of railways. The various portions of the road have been surrendered by the general government to the counties through which it passes. Though now almost forgotten, the Cumberland road was one of the most famous stage roads in the world. A ride on the top of a coach, bowling swiftly through the mountains of western Maryland and West Virginia, is described by travelers as a trip not easily forgotten. See ROAD.

Cummin. See ANISE.

Cummings, Albert Baird (1850-), an American legislator, was born at Carmichaels, Pa., and educated at Waynesburg College, Waynesburg, Pa. Later, he studied civil engineering and became assistant chief engineer of the Cincinnati, Richmond & Ft. Wayne Railroad. He studied law, was admitted to the bar in Illinois in 1875, and practiced in Chicago until 1878. Mr. Cummings removed to Des Moines, Iowa, in 1878 and was a member of the Iowa House of Representatives in 1888. In 1892 he was presidential elector-at-large, chairman of the Republican state convention, and delegate to the national convention. Mr. Cummings was Governor of Iowa from 1902 to 1908. After 1900 he became prominent through his tariff reform activity. In 1908 he went to the U. S. Senate to complete the unexpired term of Senator Allison, and was reelected for the terms from 1909-15, 1915-21, 1921-27. He has taken a prominent part in securing needed railway legislation.

Cumulus. See CLOUD.

Cuneiform (kū-nē'ĭ-fôrm) **Writing, a** primitive system of writing in use among the Chaldeans, Babylonians, and Assyrians. The name is derived from the Latin word *cuneus,* meaning wedge, and has reference to the triangular shape of the characters. The writer impressed his characters with a stylus on soft clay tablets which were afterward kiln baked. If stone was the material, the characters were cut with the chisel. For some account of the enormous number of tablets found in the ruins of ancient cities, see BABYLON.

Cupid, in Roman mythology, the god of love. He was the son of Mercury and Venus. The Romans identified with their Cupid the Greek Eros and the legends concerning him. Cupid is usually represented as a chubby, winged boy with a bow and quiver full of arrows, with which to pierce the hearts of his willing victims.

Sometimes the ancients represented him as riding on a lion or a dolphin; sometimes as breaking the thunderbolts of Jupiter, which were ways of signifying his power. Cupid is usually spoken of as blind, or blindfolded. He figures in a large number of legends. His name is of frequent occurrence in literature, and he has always been a favorite subject with sculptors and painters. Figures of children, with or without wings, introduced into works of art are frequently called cupids without any mythological allusion. See EROS.

Some Cupid kills with arrows,
Some with traps. —Shakespeare.

Love looks not with the eyes but with the mind,
And therefore is winged Cupid painted blind.
—Shakespeare.

Curaçao, an island of the Dutch West Indies, lying in the southern part of the Caribbean Sea. It is situated about 41 miles north of Venezuela, in lat. 12° N. and long. 69° W., and covers an area of 212 square miles. It has a flat surface, except for the hills in the southwest, whose highest elevation is 1,200 feet. Streams are few and the rainfall light. Fruits, tobacco, corn and sugar cane are raised to some extent, but a great part of the island is uncultivable. The principal minerals are salt and phosphate. The commerce of Curaçao is mainly with the neighboring islands and the United States. The chief industry is oil-refining. The population of Curaçao island in 1920 was 32,709, while that of its capital, Willemstad, was 12,500.

Curassow, the name of a large bird, also called crested curassow. It has a bill which is sometimes surrounded by bright colors, the head having a crest of feathers which curl forward. The upper parts of this bird are deep black, with variations of green in some parts, the lower parts and the tail coverts being of a dull white. The curassow is found in the forests of Mexico, Guiana and Brazil. It makes its nest in trees and lays white eggs. It is about the size of a turkey, and its flesh is used as a food. It is easily domesticated and is kept with poultry in several parts of South America.

Curate. See EPISCOPAL CHURCH.

Curb, a thickening of the ligaments and tissues of the back part of the hocks of horses, which is the result of a sprain, or of sudden and violent exertion, or is the effect of keeping back a load when going down hill. The swelling appears on the back and outer parts of the joints, and generally produces lameness. The best treatment consists of fomentations to allay the irritation and inflammation, and a high-heeled shoe should be put on. After the inflammation disappears, cold applications may be employed. Naturally all work must be avoided.

Curb. See STOCK EXCHANGE.

Curcas, a large bush, is native to the tropics, but is found elsewhere. The seeds are called purging-nuts. The oil pressed from the seeds is applied to parts that itch, and it has been found useful in rheumatism. The Chinese make an oil of it together with oxide of iron, which they use for lacquering boxes. The milky juice of the plant is used as a dye and makes a good marking ink also. A species grown in South America yields an oil which is used as a purgative.

Curculio. See WEEVIL.

Curfew, a Norman French term meaning to cover the fire. It belongs to a time before the invention of matches, when fires were covered up with ashes to keep live coals over night. In the reign of William the Conqueror a bell, called the curfew bell, was rung at night, as a signal to cover up the fires and retire to rest. School readers formerly taught that the curfew was an oppressive measure intended to prevent the English people from sitting up and plotting treason; but it is now believed that it was introduced in London, at least, as a measure of protection against fire. The ringing of the curfew bell is an excellent custom still adhered to in many parts of rural England. The usual hour is nine o'clock. During the past quarter of a century many cities and towns of the United States have passed what are known as curfew ordinances, requiring young people to leave the streets and retire to their homes at eight or nine in the evening, according to the season. When a town bell is not available, a few sharp

strokes are given on the fire gong. The curfew ordinance meets with wide approval among those who believe that boys and girls should be at home after nightfall. It is believed that the universal adoption of this measure would do much to reduce juvenile vice, and to empty our reform schools.

Curie, Pierre (1859-1906), and **Marie Sklodowska** (1867-), distinguished French scientists, the former born in Paris, and latter in Poland. At the age of 20 M. Curie began independent researches in chemistry and physics, and in 1895 he was appointed professor of physics and chemistry in one of the universities of Paris, and here M. and Mme. Curie met as teacher and pupil and married. They continued their researches along the lines laid out by M. Curie, working in the laboratory of the Industrial Museum of Paris, where both took several degrees. The Curies continued their experiments until the end of 1898, when they together with A. H. Becquerel announced that they had made a discovery of a new and powerful radio-active substance derived from pitchblende, which they called polonium. Further researches resulted in the discovery of radium. For this discovery they both received the Nobel prize for physics jointly with A. H. Becquerel. In 1904 M. Curie was made professor of physics at the Sorbonne, and in 1905 he was made a member of the Institute of France. His memoires were published mostly in the *Comptes Rendus* of the French Academy. M. Curie died the following year, when his wife succeeded him as professor of physics at the Sorbonne, and in 1908 was appointed chief professor of physics at the University of Paris. In 1911 she received the Nobel prize for physics and numerous other honors from both European as well as American institutions. Mme. Curie visited the United States in 1921, at which time President Harding presented her with a gram of radium valued at $100,000 and purchased by American women, together with mesotherium valued at $20,000, to enable her to carry on her work. See RADIUM.

Curitibá, the capital of the state of Paraná, Brazil, is situated on the Iguazú River, 3,200 feet above sea level. It is well built and is located on a fertile plain. There are some fine public buildings here, including a high school. Tobacco, tea, fruit and beef are some of the exports. Gold is found in the vicinity. Population, 50,000.

Curlew, a shore bird of the snipe family. The curlew is a wading bird of marshy and upland places, where it secures snails, worms, crickets, grasshoppers, beetles, and crayfish. Of North American species, the jack-curlew breeds in British America and winters from the Gulf States to Patagonia. The long-billed curlew, a fine bird two feet high, has a curved bill six inches long. It is called the sickle-bill also. It probes the earth to six inches in search of food. In lighting the wings are lifted gracefully above the back. In Scotland the European curlew is called a whaup. See SNIPE.

'T is the place, and all around it, as of old, the curlews call,
Dreary gleams about the moorland flying over Locksley Hall. —Tennyson, *Locksley Hall.*

Curling, an ancient Scottish game played on the ice. A strip of smooth ice is chosen for a rink. Two marks called tees are located about forty yards apart. The game is played with smooth hemispherical stones, weighing from thirty-five to fifty pounds, fitted with stone or wooden handles. Each player has a pair of these stones, which he holds something like a flatiron. The opposing players stand at one tee and slide their stones with great force along the ice toward the other tee. As in bowls, quoits, and pitching horseshoes, the stone which lies nearest the tee counts. No small part of the player's skill lies in his ability to drive his opponent's stone away from the tee and leave his own in position. The game is a popular one, not only in North Britain, but in Canada and in some parts of the United States. International games, or bonspiels, are not infrequently played, as between St. Paul and Winnipeg.

Curling is attended with a great deal of jollity and merrymaking. The game may be played by any even number of players from two up to sixteen. In Scotland, es-

pecially, contests between parishes are a regular winter event looked forward to by young and old; while crack teams from different parts of the country meet each other for final games. A code of rules has grown up to fit every conceivable emergency, as in the case of football, baseball, and golf.

The teams of curlers usually dress in Highland costume, at least in Highland caps, and as a sign of fellowship they carry the brooms with which they are wont to sweep the ice when it seems that a stone is not likely to go quite far enough.

Currant, a well known garden fruit. The currant is closely allied to the gooseberry, but it is smooth and more juicy. A number of kinds, both red and black, grow wild; but the red currant *(ribes rubrum)* and the black currant are the currants of the garden. It is a native of cool climates, but may be cultivated farther south in shaded places, such as orchards. The Gulf States are too warm, but with mulching, currants do remarkably well in the dry climate of the plains. Currants are hardy and endure neglect, but respond quickly to rich soil and cultivation. Currants are started by cuttings about ten inches long, planted with two or three buds above ground. Young wood is more productive than old. The old stems should be cut out as fast as young stems offer to take their place. Allow from six to eight stems to grow in each clump. Currant growers find it profitable to set new plants each year and root out those that exceed eight years. The currant worm is a great pest and can be fought to best advantage by sprinkling with a teaspoonful of powdered hellebore to a gallon of water. Currant borers can be gotten rid of best by digging up and burning the plants. Care should be used to start again with healthy cuttings. The name of the garden currant is derived from a similarity in size to the eastern currant, for which see the following article.

Currant, a Grecian raisin, produced by drying the small, sweet, seedless grape of that country. These grape currants are one of the chief crops of Greece and are much in demand by makers of cakes and puddings. Currants of this sort are really Grecian raisins. They get their name from Corinth, the city that sent most of them to market. Corinth has been changed to currant, much as "Worcester" has become "Wooster."

Currency. See MONEY; GREENBACKS; COIN; BANK.

Currents, Ocean. The waters of the ocean apart from the movement called tides, are in constant motion. At varying depths portions of the water seem to move more rapidly than the main body, much as if they were flowing from a higher to a lower level. These streams, flowing in definite directions and with a fairly uniform velocity, are called currents. The cause of ocean currents was long unknown and is yet, to some extent, a matter of theory. It is conceded generally that the chief causes are winds and the unequal heating of the waters in polar and equatorial regions. Surface currents have in general the direction of the prevailing winds. Small currents, formed as the water drifts before the wind, may be seen along the coasts of lakes. Many ocean currents begin in a similar way. The differences in temperature cause movements slower than those of the surface current but quite as important. As the waters near the equator become warmed they expand and a flow toward the poles sets in, while the cold and heavier waters of the polar regions settle, and flow as undercurrents toward the equator. The result is a constant circulation. The direction of both surface and deep-sea currents, however, is modified by the winds, by the continents which interrupt and turn them aside, and by the rotation of the earth on its axis. The earth's rotation affects the currents of the sea much as it does those of the air. By referring to the article on WINDS, an explanation of this action will be found. This gives rise to one of the main effects of currents, for we find western coasts warmer than eastern in the same latitude, and this in instances where other causes are insufficient to account for the difference. A good example is found by comparing the east and west coasts of Greenland, the latter being much the more habitable of the two. Were it not for the

equalizing effect of this interchange of waters between north and south, the ice caps of the polar seas would extend into temperate regions, while the heat of the equatorial waters would cause many forms of life to become extinct.

The physiographic effects of currents are less than those of waves, the greater force of the waves causing more erosion than can be effected by the slower movement of the currents. The currents, however, transport large quantities of material to great distances. Shells of marine animals native to the Caribbean Sea are found on the Carolina coast, brought thither by the waters of the Gulf Stream. Quantities of coral polyps who are building lands in the sea continually, are supplied with food by the various ocean currents. These are but instances of the great work done by these rivers of the sea.

Among the many ocean currents of importance a few may be mentioned by name. The Equatorial Current, nearly 1,000 miles broad, flows in a westerly direction, before the prevailing winds of that region, at a rate of ten or fifteen miles a day, and circles the earth except where the continents intervene. Meeting the continents on their eastern coasts this current, both in the Atlantic and in the Pacific, divides, flowing to north and south. In the Atlantic the northern and larger of these branches flows as a slow drift, partly into the Caribbean Sea, partly west of that body of water, between the West Indies and into the open sea. The stream which enters the Caribbean flows next into the Gulf of Mexico and emerges as the Gulf Stream. This stream is regarded as the most important of Ocean Currents and has been more thoroughly studied than any other, this study resulting, however, in considerable difference of opinion as to what is actually accomplished by the current. As it leaves the Florida strait it is a narrow, deep current of a peculiar blue color readily distinguished from the lighter water through which it flows. Its velocity, varying with the winds, the seasons, the age and passage of the moon, is from three and one-half to five and one-half miles an hour. As the Gulf Stream advances to the north along the American coast its velocity decreases. In the latitude of Cape Hatteras it turns, slowing toward the east, growing broader and shallower. It is divided by the European coast, a part turning southward again and the rest flowing in a northeasterly direction, past Scandinavia, where its warmth keeps the port of Hammerfest free from ice, to the Arctic Ocean.

So great difficulty attends the study of ocean currents, so many and such varied circumstances modify their direction, velocity, depth, and temperature, as well as their actual results, that the subject, as a science, is still in its infancy. Their influence on physiography, and on climate, is sufficient to make the subject of interest, but when their influence upon practical navigatition is considered the matter becomes one of vital importance.

Currie, Sir Arthur William (1875-), a Canadian general, the successor of Byng as commander of the Canadian forces in the World War. He was born in the little village of Napperton, in western Ontario. At the age of 18 he went to British Columbia, where he was first a school teacher and later became the head of one of the largest insurance and real estate firms in Vancouver. At the same time he was greatly interested in military affairs, enlisted in the militia, rose to be lieutenant-colonel of artillery, and won a reputation as one of the most efficient militia officers in the Dominion.

At the outbreak of the war he was given command of the Second Infantry Brigade of the First Canadian Contingent. He and his brigade won great glory at the Second Battle of Ypres, and shortly thereafter, when the Canadian Corps was organized, he was promoted to the rank of major general and given command of the First Division. In the summer of 1917, after General Byng had been promoted to the command of the Third British Army, Currie was given command of the Canadian Corps, a remarkable testimony to the confidence which the supreme command had in this civilian soldier. He led the Canadians at Passchendaele Ridge and through the "Hundred Days" in 1918. After the war he was for a short time inspector-gen-

eral of the Canadian militia, resigning in 1920 to become principal of McGill University. An unusual type of university principal, he has thoroughly justified his appointment.

Curtis, George William (1824-1892), an American editor, lecturer, and author. He was a native of Providence, Rhode Island. His reputation was first won through his sketches of travel, *Nile Notes of a Howadji,* written while traveling in Egypt and Syria. For many years, including the period of the Civil War, Curtis was political editor of *Harper's Weekly,* which he made a powerful supporter of the Union cause. For many years he was editor of the "Easy Chair" in *Harper's Magazine.* It has been said that in this work "his province and his influence resembled those of Addison and Steele in the best issues of the *Spectator.*" It is by his chatty notes and observances in the "Easy Chair" department that Mr. Curtis is best known. Among his later books are *Lotus Eating, Potiphar Papers, Prue and I.* Mr. Curtis was also known as a successful lecturer. He delivered notable memorial orations on Burns, Bryant, Irving, Lowell, and others.

In the "Easy Chair" of *Harper's Magazine,* Mr. Curtis displayed the highest qualities of an essayist. Comment on art, music, literature, current events, politics, society, was here set forth, month by month, in graceful and flexible style, animated by genial humor, often by keen satire, but always regulated by the purest taste. So nice was his sense of literary proportion, that local and ephemeral circumstances, preserved in these monthly records, have keen interest for the reader of to-day.—Shaw.

Curtiss, Glenn Hammond (1878-), an American pioneer aeronaut with a genius for automotive invention. He was born at Hammondsport, N. Y. In his early youth Mr. Curtiss was a bicycle racer. After winning several races he invented a motorcycle, and in 1902 established a motorcycle factory at Hammondsport. Riding his own machines, he set speed records in 1905 and 1906, making in the latter year a mile in 26⅖ seconds. He then turned his attention to aeronautics. He designed the first motor accepted by the United States Government for use in a dirigible balloon. In 1906 he won the *Scientific American* trophy for a flight of more than a mile, piloting an aeroplane of his own design. In 1909 he won the Gordon Bennett cup for a flight at Rheims, France, and in 1910 won the New York *World* prize of $10,000 for a flight from New York to Albany, making a distance of 142 miles in 2 hours and 51 minutes. Mr. Curtiss made a public demonstration with a hydroaeroplane in 1911. He established flying schools at San Diego, Newport News, Buffalo, Miami and other places. During the World War he assisted in expanding the American aeroplane industry to meet the war demands of Russia, Great Britain and the United States. Mr. Curtiss is the holder of many patents for aeroplane improvements, and has received medals from the Smithsonian Institution and the Aero Club of America. In the history of aeronautics he stands next to the Wright brothers.

Curtius, ker'shĭ-ŭs, **Marcus,** a hero of Roman legends. The story runs that in the year 362 B. C. a chasm opened in the forum, or marketplace, at Rome. The soothsayers were consulted and predicted great calamity, but declared that the chasm would close and calamity be averted if that which constituted the glory of the state were thrown into the abyss. While discussion was in progress as to what constituted the glory of the state, Curtius appeared, mounted on horseback and shining in armor. He exclaimed, "Rome has nothing more precious than arms and valor," and leaped into the chasm, which immediately closed.

Curzon, George Nathaniel, Lord (1859-), an English statesman. He was born at Kedleston. His education was received at Oxford, and in 1885 he became private secretary to the Marquis of Salisbury. From 1885 to 1898 he represented the Southport division of Lancashire in Parliament, acting as under-secretary for India in 1892, and under-secretary of state for foreign affairs in 1895. In 1898 he was made Viceroy and Governor-general of India, and at the same time raised to the Irish peerage, with the title of Baron Curzon of Kedleston. His administration was acceptable in India and also to the home government. He furthered the cause of educa-

tion, and instituted many reforms in the management of railways, post and telegraph services, and other government monopolies. In 1905 he resigned in consequence of disagreements with Lord Kitchener concerning the system of dual control in the Indian army. In 1908 Lord Curzon was elected a representative peer of Ireland and took his station in the House of Lords.

With other Unionist leaders he joined Asquith's coalition cabinet in 1915 as Lord of the Privy Seal. When Lloyd-George formed his ministry Lord Curzon became the leader of the House. He also was one of the four ministers who constituted the War Cabinet. After the Paris Conference he took over the Foreign Office from Mr. Balfour. His publications include *Russia in Central Asia, Problems in the Far East, Persia and the Persian Question, Lord Curzon in India,*

Cushman, Charlotte Saunders (1816-1876), an American actress, was born in Boston, Mass., of Puritan descent. She had a rich contralto voice, which she cultivated, and in 1835 she appeared in opera in the *Marriage of Figaro.* Her voice suddenly failed, which caused her great sorrow. Through the advice of a friend, she began the study of the part of Lady Macbeth, which thereafter became one of her greatest rôles. Her interpretation of Meg Merrilies in the dramatization of Scott's *Guy Mannering,* was a revelation. However, she was an actress who had most unusual gifts, and she succeeded in both comedy and tragedy. Her great rôles, aside from those above mentioned, were Bianca, Helen McGregor, Goneril, Nancy Sikes, Ophelia, Lady Teazle and many others. Her last appearance was in New York in 1874 as Lady Macbeth, which was an occasion to be remembered.

Custer, Gen. George Armstrong (1839-1876), an American soldier. Having finished his course at West Point he was sent from Washington to Gen. McDowell with dispatches just in time to take part in the battle of Bull Run. He attracted the attention of Gen. McClellan and was made an aide-de-camp. Later he became a dashing cavalry leader in the Shenandoah Valley. He was first over the river at Chickahominy, and had two horses shot under him at Gettysburg. He was promoted rapidly for bravery, and was a brigadier general four years after graduation. For a short time after the Civil War he did unwelcome patrolling in Kentucky and other states, but from 1866 to the time of his death his name is associated with those of Miles and Crook as an Indian fighter on the plains. An expedition to the Black Hills is fittingly remembered in Custer and Custer County, South Dakota. His headquarters were at Fort Lincoln, opposite Bismarck, for several winters. In the summer of 1873 his regiment was detailed to guard the engineers who were locating the extension of the Northern Pacific Railway from Bismarck through the Bad Lands to the Yellowstone Valley.

In 1876 the Sioux Indians, who saw that the advance of the railroad was depriving them of their last hunting grounds, grew ugly; and the war department decided upon a general campaign in the Yellowstone country. Gen. Sheridan directed Crook to lead a column from the south against the villages of chief Crazy Horse; and Terry, with a force including Custer and his command, was dispatched against chiefs Sitting Bull and Rain-in-the-Face. Gen. Custer accompanied Terry by way of the Missouri and Yellowstone Rivers to the mouth of the Rosebud, when they were joined by a column from the west under Gen. Gibbon.

The campaign was planned well enough. Three columns were to converge in the Yellowstone country and crush the Indians. Either column was supposed to be strong enough to disperse any force the Indians might collect. But no one had foreseen that so many dissatisfied braves would leave the reservations and join the hostiles. Unknown to Gen. Terry, Crook was repulsed, and retired to wait for reinforcements. Gibbon was sent south from the Yellowstone up one valley, Custer was sent up another searching for the Indians. Custer followed a fresh Indian trail up the Rosebud and crossed over into the head waters of the Little Big Horn. Here

he came upon the Indians, and, not dreaming they were in such force, he divided his command, ordered one-half under Major Reno to attack in the rear while he made a bold dash for the front. Reno soon found that the Indian camp was large, and drew off to a safe distance and fortified himself, leaving Custer to make the best of it. Had Reno attacked vigorously it is thought the Indians might have been stampeded; but, be that as it may, the wily savages surrounded Custer's band with din, whoop, and blazing Winchesters, and wiped out "Yellow Hair" and his troopers to a man. Instead of a few hundred warriors, the Sioux were 2,500 to 3,000 strong. The troops under Crook and Terry united later, and drove the Indians to their reservations or north into Canada, but it was too late to save Custer.

Longfellow has commemorated Custer's last battle by a poem entitled "The Revenge of Rain-in-the-Face," beginning

> In that desolate land and lone
> Where the Big Horn and the Yellowstone.

The battle ground is now occupied by a fitting monument. In Custer, Custer County, and Custer Creek of southeastern Montana, the name of the gallant soldier has found a lasting record. Sitting Bull, Custer's old enemy, lies in the military burying ground at Fort Yates. *Boots and Saddles,* by Mrs. Custer, who accompanied her husband on many of his less important expeditions, is a readable account of experience.

Customs, taxes collected on foreign goods. The United States maintains custom houses or offices at all our principal ports and wherever railroads cross the border. All imported goods are examined and duties are collected according to the tariff laws established from time to time by Congress. Some commodities, as animals for breeding purposes, coal, tea, coffee, cotton and hides of cattle are entered free. The following rates on commodities in common use were fixed in the tariff of 1922. Butter, 8 cents a pound; cheese, 5 cents a pound; eggs, 8 cents a dozen; milk, fresh, 2½ cents a gallon; cattle, from 1½ to 2 cents a pound; horses and mules valued at not over $150 each, $30 each; valued over $150, 20 per cent; sugar 2.20 cents a pound; Cuban raw, 1.76 cents a pound; wool 31 cents a pound; women's and children's dress goods from 37 cents a pound and 50 per cent; woolen cloth for men's clothes from 24 cents a pound and 50 per cent to 45 cents a pound. Some articles are entirely free. The following charges must be paid on the commodities named: butter, 8 cents a pound; fresh beef and veal, 3 cents a pound; pig iron, 75 cents a ton; hay, $4 a ton; polished window glass, 4 cents a square foot; men's leather gloves, $5 a dozen pairs; musical instruments, 40 per cent; filler tobacco $1.76 a pound; unstemmed wrapper tobacco, $2.10 a pound; cottonseed oil, 3 cents a pound; china clay, $2.50 a ton; celluloid, 40 cents a pound; olives, 20 cents a gallon; corn, 15 cents a bushel. Some articles pay a double tariff, both specific and *ad valorem,* that is according to weight and value. Carpets, knit goods, cigars, silks, yarn, and clothing belong here.

For the convenience of merchants, custom houses are maintained at many interior points to which foreign goods may be sent in bond, that is to say, in sealed cars or packages to be opened and examined on reaching their destination.

The collection of customs is in charge of the Treasury Department. The most important custom house in the United States is that of New York. The receipts are larger than those of all the other custom houses combined. See COMMERCE.

Cutlery, edged instruments. The term is akin to colter, from the Latin *culter,* meaning a knife. No doubt prehistoric man used the sliver of a bone or the splinter of a bamboo for many purposes for which we use a knife. The most primitive edged tools found in caves and burial places are sharp-edged flakes of flint, obsidian, or similar stones. The first metal knives and daggers were made of bronze. Later came iron instruments, and, last of all, came steel. The ancient Greeks and Romans understood the use of steel; yet as late as the beginning of the Christian era surgeons as well as warriors used bronze cutlery. Both swords and lancets

of bronze have been found in the excavations of Pompeii. Among the celebrated swords of the Middle Ages were the Damascus blades made in Syria, and the sword blades of Toledo, Spain. Sheffield, England, was noted as a center of the cutlery business as early as the time of Chaucer, one of whose characters bore a Sheffield whittle in his hose. Sheffield is still the great center of table and pocket cutlery. Birmingham leads in the making of swords and implements. The jointed knife, now known as a jackknife, is said to have been introduced into England from the Low Countries in the reign of Elizabeth. The spring back was invented a century later.

The making of a good blade, whether for a knife or a razor, is an art in itself. Forging, hardening, tempering, grinding, and polishing have been reduced to a system; so that, of a score of knives or razors of a given brand, especially of more expensive makes, there is little difference in quality.

The term cutlery is somewhat elastic. Table knives, with dull edges, and forks, with no edge at all, are included with clasp knives, razors, scissors, and similar articles under the name of cutlery; while sickles, scythes, and a great number of other sharp-edged tools are considered implements, or else they are grouped with surgical instruments, pruning knives, butchers' and shoemakers' knives, chisels, and augurs, under the head of edged tools.

In keeping with their usual reputation for inventive genius, American manufacturers have introduced many improved methods in the making of tools, knives, and razors. American cutlery now ranks with the best European makes, and some lines find a large European market. The business of making cutlery is now an important one. The following statistics are taken from the United States census report and make it clear how valuable this industry has become:

Number of factories	304
Capital employed	$68,971,247
Wage earners	19,859
Wages	$20,048,465
Cost of steel and other material	$19,477,437
Value of cutlery	$66,629,570

See SHEFFIELD; TOOLS; TOLEDO; SWORD.

Cutter. See SLED.

Cuttlefish, a well known mollusk without an external shell. The cuttlefish is known to zoölogists as a cephalopod. It is related to the squid and the octopus. The body is oval, but is somewhat flattened. A thin flap of skin like a frilled fin runs down each side. The animal has two prominent eyes. The mouth is surrounded by eight short arms and two long tentacles, or feelers. Each arm carries four rows of raised suckers. The two long arms, or tentacles, terminate in circular, saucer-shaped suckers. The cuttlefish uses these arms to attach itself to objects and to seize prey. The cuttlefish "walks" by laying hold of stones and other objects with its suckers and dragging the body about. By expelling water forcibly from a tube beneath the head, the animal is able to dart backward with unexpected rapidity.

The common cuttlefish of the British coast is a pest to fishermen. It ruins the fish in their nets and is difficult to catch. When alarmed the animal ejects an inky liquid which discolors the water for yards, and enables the cuttlefish to escape unseen. This liquid is the sepia ink of commerce, so indispensable to draftsmen. An internal shell at the back of the body is the cuttlefish bone fed canaries. It is also crushed to form a powder, called pounce, which was shaken on a newly written page to dry the ink before blotters were invented. Pounce is still used for tooth powder, and in the making of molds for silver castings. Clusters of cuttlefish eggs are cast ashore by the waves and are sometimes called sea grapes.

A very curious habit of the cuttlefish is the way it changes its color. This it can do at will. If it happens to find itself on a sandy bed, where the pebbles are variously colored, yellow and black, it can change its color so that it takes a keen eye to distinguish the animal from its surroundings. If it moves into a region where dark rocks abound, the little spots, specks, or stripes with which it was adorned a half-hour before disappear, and a dark, nearly

black animal is seen. These sudden changes in color are brought about by means of large cells in the skin, which are filled with coloring matter; as these cells contract or expand, the color of the animal changes.

See SQUID; OCTOPUS.

Cutworm, the caterpillar of certain nocturnal or owlet moths. The eggs are laid in midsummer. During the autumn vegetation is so plentiful and the caterpillars so small that they attract no notice; but they stay in the ground over winter and commit frightful ravages in the spring. The common cutworm crawls about chiefly at night in search of a tender meal, and cuts off a young plant at the very surface of the ground. During the daytime they may be found coiled up comfortably in the ground near by. When night arrives the cutworm may feed again on the stub of the same plant, or it may pull the top into the ground for additional meals; but the chances are that it will cut off a plant or two each night until the stems are too old and tough for that kind of work. Entire fields of beans, peas, onions, and corn, or melon vines, may be swept away in a few nights. For a few garden vegetables it is quite possible to insert old cans around choice plants, and to search the cutworms out each morning. The earlier, the more easily they are located. Gardeners say that holes a few inches deep, made with the handle of a hoe, make good traps. In hunting for a place to hide at daylight the worm falls in, and may be taken in the morning hours before he climbs up the steep sides and gets out again. Gardens dressed heavily with barnyard manure are especially subject to cutworms.

Cuvier, kü-ve-ā′, **Georges** (1769-1832), a noted French scientist. He was educated at Stuttgart. After a term of service as a tutor in Normandy, he was invited in 1795 to Paris to a position from which he was soon transferred to a chair of zoölogy in the Garden of Plants. Here he began at once what was destined to become the largest natural history collection in Europe. Cuvier was honored with membership in the scientific societies of France, and became a leading spirit. Under Napoleon he was instrumental in the founding of academies in newly attached territory. From this time on, save during the reign of Charles X, he held high office. He was appointed minister of the interior just before his death. At his death he was considered the most eminent naturalist in Europe.

Cuvier's service to science is a classification of animals which is followed by scientists to the present day. In his *Animal Kingdom,* he classified all animals according to the arrangement of their bones or hard parts, rather than according to their appearance or size. His chief headings were Vertebrates, Articulates, Mollusks, and Radiates. His works are a mine of information in natural history, and "afford the strongest arguments in favor of the theory of a progressive series of animals, advancing from the most simple to the most complex forms of organizations." The chalk basin in which Paris is situated supplied Cuvier with a variety of interesting fossils. He is regarded as the father of the study of paleontology, or the science of fossil life. He was prominent, too, in the science of comparative anatomy. He taught, for instance, that the flipper of a seal, the wing of a bat, the wing of a bird, the fore-leg of a horse, and the arm of a man are one and the same organ modified by circumstances. He wrote scientific papers innumerable. His published works reached many volumes.

Cybele, sĭb′e-lē, or sĭb-ē′lē, in classical mythology, the "Great Mother of the Gods." Her worship seems to have originated in Phrygia. Her proper name was Agdistes, but, as she was the goddess of caves, mountains, and the haunts of wild animals, she came to be called Cybele, the Phrygian word for caves. Her priests were called Corybantes, and her rites included wild dances accompanied with drum and fife. She was early identified with the Greek Rhea, and is sometimes called Rhea Cybele. The Romans identified her with their Ops, and used both names—Ops and Cybele. According to the old legend Cybele was the daughter of Maeon, king of Phrygia. Maeon, vexed that the child was not a boy, exposed her on Mount Cybelus.

There the infant was nourished by panthers and lions, and later was cared for by the wives of herdsmen. Grown to womanhood, she invented the fife and drum, and by their aid healed diseases of men and beasts. She became enamored of Atys, a beautiful youth. Her parents now recognized and received her, but her father was displeased with her lover, and had him executed, causing Cybele to become demented.

Among the Greeks, Cybele was regarded as the wife of Cronos and mother of the Olympian gods. She symbolized the fruitfulness of the earth. She was the goddess of vine-growing, agriculture, and town life. During the Second Punic War, the Sibylline Fates prophesied that if Cybele's image were brought to Rome, it would expel a common foe. This image was nothing but a dark, quadrangular, meteoric stone in a cave in the mountains of Phrygia. It was brought to Rome, and thus the worship of Cybele was introduced among the Romans. She was later identified with the Roman Ops, goddess of plenty.

Cybele is represented in ancient art as a matronly woman, usually seated, with lions at her side. Sometimes she wears a mural crown, and a veil is draped about her head, symbolizing the mysterious in nature. Other emblems are a staff, a drum, ears of corn, the sun and moon in either hand. Occasionally she is pictured as riding in a chariot drawn by lions, and bearing a thunderbolt in her hand. These are all symbolic of power, and of Cybele's aid in advancing civilization.

See ATALANTA; ATYS.

Cyclades, the principal group of islands in the Aegean Sea. They are twelve in number. The name is Grecian, and is derived from the same source as cycle, bicycle, etc. It was given because the islands were thought to form a ring about Delos. The islands are still known as the Cyclades, and form a department of modern Greece. The islands are volcanic. The inhabitants are engaged in fishing and in raising olives and grapes. The goat is the chief domestic animal. The capital is Hermopolis. Area, 928 square miles. The population of the Cyclades in 1907 was about 130,000.

Cyclamen, sĭk'lă-mĕn, a beautiful greenhouse flower widely introduced from Persia. The flower scapes and leaves spring from a tuber. The leaves are heart-shaped and are beautifully variegated. The petals bend sharply backward, giving the flower at first glimpse somewhat the appearance of a violet. The petals vary in color from white to rose. The common varieties are scentless. The cyclamen is raised chiefly from seed. The seed appears to require two months to germinate, but in reality it produces a small corm before leaves appear. The genus belongs to the primrose family. See PRIMROSE.

Cyclom'eter, an instrument which measures and records the distance traveled by a wheeled vehicle. It came into common use with the bicycle and under various names such as odometer, auto-meter, and speedometer, is considered essential to any completely equipped automobile. These instruments look something like small clocks on whose dial one may read the distances from numbers which are moved by a train of wheels inside. They have reached a high degree of perfection, some of them having clock attachments, and indicating the speed in miles per hour and the total distance traveled, as well as that of the individual trip.

Cyclone, a whirlwind on a vast scale. As now used by scientists, the term is to be distinguished with care. The "western cyclone," a violent, destructive whirlwind of the Mississippi Valley, should be called a tornado; the still larger, violent, destructive whirlwind of the West Indies and the Atlantic is a hurricane; the very similar whirlwind of the East Indies, the Philippines, and the Pacific is called a typhoon. In the sense that a cyclone is a whirling and revolving wind, it cannot be denied that all three of these winds, the tornado, the hurricane, and the typhoon, are cyclones; but it is convenient and now customary to reserve the term cyclone for vast circular movements of air, hundreds of miles in diameter, that are taking place all the time, and are matters of every day experience.

Confining our discussion to North America, we may say, to start with, that our

ordinary breezes, calms, and winds are but parts of a cyclone, and that a cyclone is simply an ordinary wind. The prevailing movement of air in the north temperate zone is from the west. If the surface of the United States and southern Canada were a low, flat plain, with the lines of equal heat running uniformly and permanently along the parallels of latitude, we should have, so far as local conditions govern, monotonous westerly winds the year around. As a matter of fact, the air in our belt travels steadily in an easterly or northeasterly direction, but it does so in vast swirls that follow each other eastward at intervals of from three to seven days. They travel across the continent at a rate of from 500 to 1,000 miles a day. These swirls or cyclones account for the different directions of wind. As the air moves in a whirl it is evident that an east wind in one edge of a cyclone must be a west wind in the opposite edge of the same cyclone. If the wind in the east edge of a cyclone is from the south, the wind in the west edge of the same swirl must be from the north. If a locality be in the pathway of the center of a cyclone, it is evident that the wind for that locality must change in direction as the cyclone advances.

The writer recalls a personal observation of this sort at Fargo in the Red River Valley one midwinter. As the evening of a fine day drew on, a furious south wind sprang up and brought a heavy fall of damp snow. The flakes fell in rags, such as Villon describes as falling in Paris. The town went to sleep in a warm, blinding snowstorm. The next morning the air was calm, the sun was shining, and the world lay still and white. At eventide again, a high wind was raging, and the air was filled with fine icy crystals, this time from the north. It seemed as though the wet, clinging, flaky snow from the south, and the fine, icy snow from the north, with a calm between, were the eastern edge, the western edge, and the central portion of a cyclone moving toward the Atlantic coast. By getting reports from all parts of a cyclone, the United States Weather Bureau is able to forecast the weather within the area occupied by the cyclone. It is essential to understand that the direction of a cyclone as a whole is a different thing from the direction of a particular part of the cyclone. The four quarters of a wagon tire are moving upward and forward, downward and backward, but the wheel as a whole is moving forward. One edge of a swirl in a stream is moving downward, and the opposite edge is moving upward, but the swirl as a whole is going down stream.

If the reader has gained a notion of circular winds on a large scale traveling eastward, he is ready for the notion that the direction of a cyclone current is spiral, rather than circular. The origin of a cyclone is not altogether clear, but, however that may be, the center of the whirl is an area of low barometric pressure, an area in which the air is less dense and toward which the air is rushing to even up the pressure. This combination of a circular direction and a direction toward the center gives the cyclonic current more or less of a spiral movement toward the center. This increase of density is likely to be accompanied by rainfall or snowfall. The area in which this precipitation occurs is known as a cyclonic storm. The storm area is much smaller than the entire cyclone. If the observer will stand with his back to the wind—this for a wind or a breeze in the northern hemisphere—the center of the cyclone will be on the left hand. If he remember that the center is traveling eastward, he can locate the entire cyclone in a general way. Corresponding to cyclonic movements of air about centers of low pressure, we have also cyclonic movements around centers of great density —centers of high pressure. Under these conditions the currents wind spirally from the central area outward. Such an area of cyclonic movement is called an anti-cyclone. An area of high pressure, the density of which is undergoing decrease by reason of an anti-cyclonic movement, is an area of fine weather.

Put in another way, we may say that as the density of the air in an area increases, its capacity to hold moisture decreases. The central area of a cyclone is an area then of probable precipitation. On the other hand, the capacity of air to hold moisture

increases with increasing rarity. The central area of an anti-cyclone, therefore, is likely to be an area of fine weather. As a falling barometer indicates the approach of a cyclonic center, it also indicates a probability of rain. In like manner, a rising barometer indicates the approach of an area of anti-cyclonic air, and probable fair weather. Our cyclones originate in the southwest and in the northwest, or else they come from the Pacific.

Cyclops, sī′klŏps, in Greek mythology, a giant with a single circular eye in the middle of his forehead. The word cyclops means "round-eyed." There seem to be several distinct legends. According to one account, there were three Titanic Cyclops, sons of Heaven and Earth. They labored in Mt. Aetna under the direction of Vulcan, forging the thunderbolts of Zeus, the helmet of Pluto, and the trident of Poseidon.

In the adventures of Ulysses, Homer describes a race of one-eyed Cyclops, who lived solitarily in the caves of Sicily, rearing sheep and goats. When Ulysses and a number of his companions applied to one of them, Polyphemus, for aid, the Cyclops shut them up in his cave with his flocks, closing the entrance at night with a huge rock that twenty men could not have rolled away from the door. In the morning he sent his flocks out to feed, but guarded the doorway, so that his prisoners might not escape. At each meal he devoured two of them. Ulysses tried to pacify the giant by giving him a bottle of wine which he had hoarded for an emergency. The only satisfaction he obtained, however, was a promise that he should not be eaten until the last. Becoming desperate, he laid plans with his companions; and that night, while Polyphemus lay asleep, he placed the end of his staff in the fire until it was a glowing coal. This he thrust into the giant's only eye, depriving him of sight, and causing him to howl with pain. Polyphemus groped around the cavern in vain, trying to capture the Greeks, who skillfully evaded him by keeping among the sheep. In the morning they tied rams together, three and three, and by clinging to the wool on the bellies of the central rams they made their escape through the doorway, though the Cyclops felt the sheep as they passed that his prisoners might not escape. As soon as they passed beyond his reach, Ulysses and the remaining companions dropped to the ground. They bore the sheep aboard their boat and made off. When a short distance from the shore Ulysses could not refrain from taunting the Cyclops, who broke off a huge fragment of rock and threw it toward the sound of Ulysses' voice, almost swamping the ship.

Still another account represents the Cyclops as a race of giants from Thrace, who, being expelled from their own country, wandered under their king, Cyclops, throughout Greece, building tremendous stone walls, remains of which may be seen to this day at Mycenae and elsewhere. The stones are of such size that it seems incredible that ordinary people ever could have laid them in place, whence the term cyclopean rocks, masonry, etc.

In zoölogy, the cyclops is an energetic water flea that darts about with great vivacity, catching and devouring its minute neighbors. It depends on agility, rather than strength. It derives its name from an apparently single black eye in the middle of its head.

Cygnus, or **Cycnus,** sĭg′nŭs, in Greek mythology, an intimate friend of Phaeton, who, having borrowed the chariot of his father, Phoebus Apollo, nearly set the world on fire. Phaeton was slain by a thunderbolt of Jove and fell headlong into the great river Eridanus. Cygnus mourned long and deeply for his friend. He would spend hours wandering on the shores of the river which had received Phaeton's body. Frequently he would plunge into the waters, occasionally bringing to the surface some ghastly relic of the disaster. Finally, in pity or in anger, the gods changed him into a great bird. Still he sailed pensively about upon the river where his friend was drowned, often bending his long white neck and thrusting his head below the surface, as though still searching for some sad trophy of the beloved Phaeton. This is the way swans came into the world.

Cynic, sĭn′ĭk, one of an ancient school of philosophers founded by Antisthenes at

Athens about 380 B. C. The doctrines of Antisthenes were probably a severe interpretation of those of Socrates, whose pupil he had been. Antisthenes taught:

1. That virtue is the only good.
2. That pleasure for its own sake is wrong.
3. That in self-control lies the essence of virtue.

The cynics argued that, by acquiring an ability to do without the externalities of life, man becomes assimilated to God. Diogenes was Antisthenes' most noted pupil. Indeed, he so far outstripped his master that it is his name, rather than that of the true founder of the school, that comes to mind when the cynics are mentioned. The cynics carried their theories so far in trying to live the "simple life" that they not only became ridiculous, but even deserving of the contempt which they received in large measure. In fact, the name cynic is a Greek word meaning "dog," applied to these men because, in their disregard of opinion, they relapsed into carelessness and slovenly manners, and even into neglect of decency. On account of the cynic's scorn of social customs and other people's views, the word cynic has come to mean one who sees a selfish motive in all actions, and hence finds little to commend. A cynical person is therefore one who has little regard for the finer feelings or respect for the motives of others. In place of principle, he recognizes policy. See STOICS.

The cynic is one who never sees a good quality in a man, and never fails to see a bad one. He is the human owl, vigilant in darkness and blind to light, mousing for vermin, and never seeing noble game. The cynic puts all human actions into only two classes—openly bad, and secretly bad. . . . If Mr. A is pronounced a religious man, he will reply: yes, on Sundays. Mr. B has just joined the church: certainly; the elections are coming on. The minister of the gospel is called an example of diligence: it is his trade. Such a man is generous: of other men's money. This man is obliging: to lull suspicion and cheat you. That man is upright: because he is green.—Henry Ward Beecher.

Cynosura, Ursa Minor, or **Little Bear,** a north polar constellation. The Greek name signifies dog's tail. Cynosura was a nymph of Mount Ida, a nurse of Zeus, who was transported to the sky and metamorphosed into the constellation. As pictured by the ancients, the tip of the tail is marked by the north star or polar star. The name of the constellation was applied to the star. As Cynosura or the polar star was the sole guide, the compass, of the ancient mariner, it was watched by all eyes. The invention of the compass has withdrawn attention from the pole star, and cynosure is now used more frequently to designate merely a center of attraction,—any object to which general attention is directed.

> Meadows trim with daisies pied,
> Shallow brooks and rivers wide;
> Towers and battlements it sees
> Bosom'd high in tufted trees,
> Where perhaps some beauty lies,
> The cynosure of neighboring eyes.
> —Milton, *L'Allegro.*

Cypress, an evergreen tree akin to our white cedar and arbor vitae. The cypress of history is native to the countries of the Eastern Mediterranean region and eastward to Persia. A cypress in Lombardy twenty-three feet in circumference is believed to have been alive in the days of Julius Caesar. In making his road over the Simplon Pass, Napoleon turned aside to save this tree. The wood of the cypress is heavy, firm, and full of resin, which excludes water and is not subject to the attacks of insects. For these reasons cypress wood is the type of durability. It is thought that the gopher wood of the Old Testament was cypress. The ancients were familiar with the qualities of cypress wood. The Egyptians used it in making mummy cases. A statue of Jupiter carved out of cypress is stated, on the authority of Pliny, to have existed 600 years. The cypress doors of St. Peter's Church in Rome are said to have lasted 400 years and to have shown no sign of decay when changed for bronze ones. "Cypress was in request for poles, rafts, joists, and for the construction of wine presses, tables, and musical instruments, and on that account was so valuable that a plantation of cypress was considered a sufficient dowry for a daughter." Laws were engraved on cypress tablets. The family treasure was entrusted to a cypress chest. The bold cypress is a valuable American timber tree, often over 100 feet high.

The cypress of the Levant is a slender, dark, gloomy, stately tree, 60 to 100 feet in height. If a tree be cut down, the stump never sprouts again. It has long been considered the emblem of mourning and the symbol of death. Eastern nations plant it in their cemeteries, and place twigs in the coffin of the dead. The cemeteries about Constantinople are dense cypress groves. A cypress tree planted by a grave keeps solemn guard through the centuries. It is to this popular fancy that Longfellow alludes:

> And, by the cypresses
> Softly o'ershadowed,
> Until the Angel
> Calls them, they slumber!

Cypripedium, sĭp-rĭ-pē′dĭ-ŭm. See LADY'S SLIPPER.

Cyprus, an Asiatic island in the eastern end of the Mediterranean. Its area is about 3,560 square miles. Its population is about 300,000, equal to that of Minneapolis. The island is mountainous. The central peak is 6,400 feet high. The streams or short mountain torrents go dry in midsummer. Roads, telegraphs, over 300 schools, post-offices, and cables reaching Egypt and the Syrian coast, insure the intellectual development of the people. The raising of sheep and goats, of cotton, silk, raisins, wool, figs, olives, oranges, and tobacco, the making of cheese and wine, and the management of forests and sponge fishing engage the inhabitants. There are valuable quarries of building stone and ancient mines of copper. In fact, the English word, copper, is a corruption of cypress—c having the sound of k. By the ancients Cyprus was considered the halfway house between Asia and Greece. The island has been under the rule of Tyre, Assyria, Egypt, Persia, Alexandria, Rome, Constantinople, the Arabs, the Crusaders, the Turks and, since the Russo-Turkish war of 1877-8, of Great Britain, under whose rule life and property are finally secure. About one-fourth of the inhabitants are Mohammedan, the rest are chiefly members of the Greek Church. In mythology Cyprus was sacred to Venus. Recent excavations on the sites of former temples have brought forth many treasures of art.

Cyrus, sī′rus, king of Persia. Herodotus gives many incidents of his early life that rest on doubtful authority. He was a prince of Persia, then tributary to Media. In 559 B. C. he led a revolt against the authority of the Medes and established an independent Persian kingdom. Later he made war on the Medes and turned the tables, making Media a tributary state of Persia. Babylon, Syria, and Asia Minor were added to the Persian domains. The Hebrews remember Cyrus kindly because the overthrow of Babylon released them from a long captivity and permitted their return to Palestine. The Greeks had little cause to bless his memory; for he subdued the Greek cities on the coast of Asia Minor and replaced the mild rule of the Lydian Croesus by Persian despotism. He laid the foundation of the great Persian Empire that later absorbed Egypt. It extended northward and eastward until it embraced Asia from the Hellespont to the Indus. Cyrus is to be remembered as having founded the world power that preceded the still greater empire of Alexander. He well deserves the name of Cyrus the Great. He lost his life 529 B. C. in an expedition against the Scythians, a warlike people northeast of the Caspian Sea. See CROESUS; BABYLON.

Cyrus the Younger (424-401 B. C.), a prince of Persia. He was the younger brother of Artaxerxes, king of Persia. He was pardoned once, it is claimed, for attempting to supplant his brother, and was sent to rule Asia Minor. Here he interested himself in Grecian politics, taking the part of Sparta. In 401 B. C. he enlisted 10,000 Spartans, and with a large force of Asiatic allies advanced through Asia Minor on Babylon. At the battle of Cunaxa, near the great capital, his army was defeated and he was slain. The upward march, the stand of the ten thousand, and their marvelous retreat are the theme of Xenophon's *Anabasis*.

Czar (zär), the title of the former emperors of Russia. It has long been considered a corruption of the word Caesar, used by the emperors of Rome and the East, as Caesar Augustus. Modern scholarship is rather of the opinion, however, that the

word, czar or tsar, is of Tartar origin—a survival of the time when that people occupied eastern Europe. The czar was not only the arbitrary ruler of his people; but he was the sacred head of the Greek Church, the national church of Russia. See RUSSIA.

Czecho-Slovakia, chĕkō-slō-väk'ĭ-ä, a republic composed of the former Austrian states of Bohemia, Moravia, part of Silesia, and the district of Hungary known as Slovakia. Area, 54,264 square miles; population, about 13,595,816. There are sixteen districts subdivided into counties. The natural wealth is estimated at $15,000,000,000. The republic is very democratic. Suffrage is universal to both men and women in all departments of government. The court system of the old Austrian government has been embodied.

The people, called Czechs, are a western branch of the Slavonic race. They include the Moravians, the Slovacs of Hungary, and the Bohemians. They are allied to the Poles and to the Russians. In the day of John Huss and Jerome of Prague this element was one of the most prominent in central Europe, but persecution, exile, conquest, and oppression pretty effectually suppressed for a time rising intellectuality. The Czechs have a well developed language and quite a literature. The alphabet contains forty-two letters, and is more nearly phonetic than ours. Instead of borrowing, they make new words as they need them. They would be more apt for instance, to call a bicycle a two-wheel than to borrow a Greek word as we have done. The language is noted for subtle shades of distinction. A part of the instruction in the University of Prague is given in this tongue. Czech newspapers and books are multiplying. The literature is especially rich in folklore, song, and fiction. The Czech mind is gifted in scientific research. There are almost no illiterates. The school system is complete. There is a great university at Prague, and others are being established in Moravia and Slovakia.

The majority of the people are Roman Catholic, a small minority being Jewish or Protestant. Church and state are separate.

The republic has been recognized by the United States, by Great Britain, Italy, Japan, and France. It proclaimed its independence in October, 1918, and drafted its constitution in Switzerland a month later. At the request of the Allies the Czechs maintained four distinct armies fighting against different countries in the World War. See BOHEMIA; MORAVIA; AUSTRIA; PRAGUE; HUSS, JOHN.

STATISTICS. The following are the latest reliable statistics available:

Land area, square miles	54,264
Forest area, square miles	17,364
Population (1921)	13,595,816
Czechs	6,000,000
Germans	3,700,000
Slovaks	1,700,000
Magyars	1,200,000
Ruthenians	300,000
Poles	250,000
Chief Cities:	
Prague	672,476
Brno	221,422
Bratislava	93,329
Plzen	88,447
Number of provinces	5
Members of senate	150
Members of chamber of deputies	300
National revenue	$18,000,000
Bonded indebtedness	$2,000,000,000
Farm area, acres	9,790,500
Wheat, bushels	40,673,000
Corn, bushels	10,501,000
Rye, bushels	54,382,000
Oats, bushels	72,351,000
Barley, bushels	47,364,000
Potatoes, bushels	136,429,000
Flax seed, bushels	313,000
Sugar beets, short tons	770,386
Hops, pounds	11,610,000
Domestic Animals:	
Horses	581,257
Cattle	4,213,454
Sheep	975,889
Goats	1,174,045
Swine	2,015,211
Manufacturing establishments	8,833
Textile mills	1,999
Glass factories	1,755
Chemical factories	458
Output of sugar, tons	712,900
Output of radium, grams	2
Lignite mined, tons	19,695,504
Hard coal mined, tons	11,130,843
Imports	$3,276,700,000
Exports	$3,237,960,000
Miles of railway	8,497
Number of elementary schools	13,417
Pupils enrolled	1,931,690

D

Daddy-Long-Legs, an insect-like creature with exceedingly long, slender legs, closely related to the spider. Known also as harvestman and grandfather graybeard. The legs are very long and are bent up in the middle, so that the body sags down as though the legs were too weak to support it. When held by one leg the harvestman first points in this direction, then in that. Boys going after the cows catch a "daddy" to make him tell which way the cows have gone. He points first one way, then another, and is sure to hit on the right direction after a time. The daddy-long-legs has a disagreeable odor, but he lives on plant lice and is perfectly harmless. See SPIDER.

Daedalus, dĕd′a-lŭs, in Greek legend, an Athenian artisan and mechanician. He was credited with the execution of many notable works, temples, altars, etc. The Greeks claimed that he invented carpentry and many tools, such as the saw, axe, and gimlet. Daedalus was also a famous sculptor. He made a statue of Heracles so lifelike that it had to be tied to keep it from running away. He was regarded as the personification of art and handicrafts, and was worshiped by artists' guilds in various places. His nephew, Talos, showed some skill as an inventor. Daedalus became jealous of his talent and murdered him. For this deed he was driven to Crete. Here he built the famous labyrinth for King Minos. Later he lost the favor of Minos and was confined in a tower. He succeeded in escaping from confinement, but could not leave the island as the king had every vessel searched. "Minos may control land and sea, but not the air," said Daedalus. He then constructed a pair of wings for himself, and, finding he could use them successfully, made another pair for his son Icarus. When they had practiced flying enough to feel safe, they started over the sea. Daedalus crossed safely; but Icarus, exulting as he felt himself borne aloft by his wings, flew too high. The heat of the sun melted the wax which held the wings in place, and poor Icarus fell into the sea and was drowned. Daedalus reached Sicily in safety, where he was protected from the anger of Minos, and erected many famous works. See ARIADNE; LABYRINTH; MINOS; ICARUS.

Daffodil, a lily-like flowering herb belonging to the same family as the iris, or blue flag, and the blue-eyed grass. The flower scape springs from a bulb; the corolla is noticeable for a trumpet-shaped hood, rising in its center. Narcissus, the botanical name, includes daffodils and jonquils. The common daffodil is a meadow plant eighteen inches high, found from Sweden and England to Spain and Austria. Wordsworth's delight in the daffodil is worth a place here:

I wandered lonely as a cloud
That floats on high o'er vales and hills,
When all at once I saw a crowd,
A host of golden daffodils,—
Beside the lake, beneath the trees,
Fluttering, dancing in the breeze.

There are a large number of varieties of daffodils in cultivation. Among the more interesting is the hoop-petticoat daffodil, which has solitary, erect, yellow flowers. Another variety, the rush daffodil, has a short crown and slender, drooping tube.

Then the pied wind-flowers and the tulip tall,
And narcissi, the fairest among them all,
Who gaze on their eyes in the stream's recess,
Till they die of their own dear loveliness.
—Shelley.

Daguerreotype, dà-gĕr′o-tīp, a picture produced by the earliest process of photography. The method was described in 1837 by Daguerre of Paris, for whom the process was named. The lights and shadows of a figure were fixed by light rays on a copper plate, thinly coated with silver. The plate was first placed in a bath of iodine vapor to render it sensitive. Old-fashioned daguerreotypes may be found among family treasures. They differ from photographs

in that each exposure yielded one picture—a positive which could not be multiplied. To obtain six pictures it was necessary to sit six times. Daguerre was rewarded by the French government by membership in the Legion of Honor and a pension of $1,200. See PHOTOGRAPHY.

Dahlia, däl′yȧ, a genus of flowering herbs, remotely akin to sunflowers and asters, and closely related to the coreopsis and beggar's tick. There are several wild species, native to Mexico. The dahlia was named by Linnaeus for his student, Dr. Dahl. The original plant is said to be eight feet high, with a single row of dull scarlet rays and a yellow center. Florists now claim 2,000 varieties, mostly double, in every hue known to the horticultural show. The dahlia is raised generally from spindle-shaped tubers, of which the plant produces a cluster late in autumn. They need the same care as potatoes. The dahlia has been considered a coarse flower, but of late it is sharing the interest which has been shown in the chrysanthemum. One of the popular new forms has flowers not unlike a cactus, and is called the cactus variety.

Dail Eireann, the Gaelic term applied to the Irish legislative assembly outside of Ulster. At the General Parliamentary election held throughout Great Britain, in 1918, seventy-three Sinn Fein candidates were elected. These delegates refused to take their seats in the British Parliament. On January 21, 1919, twenty-five of them assembled in the Mansion House, Dublin, and organized the Irish Parliament (Dail Eireann). Eamon DeValera was elected President of the Irish Republic, and Charles Birgens was chosen Speaker of the Assembly. The Dail Eireann was the only stable governing element in Ireland during the anarchic days immediately preceding the formation of the Irish Free State (which see); and it was on orders from this body that hostilities ceased, following the signing of the treaty with Great Britain.

Dairying, that branch of agriculture that is concerned with the production of milk and the manufacture of milk products, as butter, cheese, etc. Great strides have been made in this branch of agriculture in the last few decades; it has become highly specialized, and the dairy husbandman usually raises only such crops as will serve as feed for his stock. Modern dairys are still of several kinds. One produces milk and cream for direct delivery to the consumer; another delivers milk to a creamery, where it is made into butter, cheese, etc.; another manufactures butter or cheese at the source of the milk supply.

Formerly, only that milk and those milk products that the agriculturist could not himself consume were marketed; and often they were not marketed at all owing to the lack of proper transportation facilities or the absence of a market. And even when specialization began, dairying was confined to the summer months. Among the numerous aids to the extension of the activities of the industry so as to cover the entire year, four stand out as particularly valuable. These are the modern light, warm, dry and sanitary dairy barn and its almost universal accompaniment, the silo (See SILO); the fast railroad train; and the motor truck. The old practice was to allow the milch cows to go dry in winter, to feed them insufficiently and to provide for them only rough shelter.

Like advances in all other industries, advances in the dairying industry were not confined to any one locality, though Denmark and the United States have brought it to the highest pitch. After the industry was recognized as a source of fair profit and as a valuable aid to the provisioning of the race, many of the finest scientific minds engaged in the study of milk and milk products as food; and in the invention and perfection of machinery to assist in the production of these. The characteristics and milk producing abilities of the various breeds of cattle were studied; bovine diseases and milk impurities were attacked with a view to purifying an industry which, if the utmost in sanitation were not followed, could become an extremely potent source of disease.

In the many agricultural colleges and agricultural departments of state universities in the United States thousands of young men and women yearly learn the most modern methods of successful dairy-

ing. This involves the study of agriculture proper with reference to the raising of necessary forage crops; dairy sanitation; the handling and treatment of sick cattle; the use of milking, separating and churning machinery; the making of silage; and a number of related subjects. The result of this scientific activity is that the quality and quantity of dairy products increases yearly.

Milk and its products have been used by man for many centuries. Milk and whey are mentioned in the Bible and in literature that antedates the Bible by man hundreds of years. A knowledge of cheese making among the ancients is attested by the writings of Greeks, Romans and Egyptians. From these writings we also gather the information that the milk of sheep, goats, cows, camels, asses and mares was used. Today the Lapps and Eskimos use the milk of the reindeer and the natives of India and Ceylon use zebu's milk. The cow was found to excel all other animals as a milk producer, and in the western world cow's milk is used almost exclusively. After Denmark and the United States showed the way, Canada, Russia and Australia made rapid advances in dairying.

Between the taking of the thirteenth and fourteenth censuses in the United States, the total value of dairy products more than doubled. In 1919 the value was $1,481,462,091, while in 1909 it was $596,413,463. The east north central states—Ohio, Indiana, Illinois, Michigan and Wisconsin—produced about 33 per cent of the total. The smallest part of the total came from the mountain states. The amount of milk sold in 1919 was 2,529,331,413 gallons, almost double the amount sold ten years previously. In the same year 532,244,072 pounds of butter fat and 207,859,564 pounds of butter were sold; the figures show a decrease in the amount of these two milk products sold during the period indicated above. Of the states of the Union, Wisconsin produces the greatest amount of milk. See CHEESE; MILK; BUTTER; COW.

Daisy, a low, flowering plant allied to the aster. The word is a contraction of day's eye, in allusion to the sun-like flower. The common daisy is found in meadows and pastures throughout Europe. The leaves form a small rosette on the ground. The tiny scapes bear a flower each, though one cultivated variety, known as the "hen-and-chickens" has a central flower surrounded by a brood of a dozen small ones. On the approach of rain or nightfall the straps of the daisy curl up. It is a flower that "goes to bed with the sun, and with him rises weeping." The daisy is a favorite with the poets. Chaucer writes:

To seen this floure agenst the sunne sprede
Whan it riseth early by the morrow,
That blissful sight softeneth all my sorrow.

and again,

Of all the floures in the mede,
Than love I most these floures white and rede,
Soch that men callen daisies in our toun.

Milton, ere he lost his sight, rejoiced in

Meadows trim with daisies pied.

In Scotland, the daisy is called the gowan.

Dakota, a former territory of the United States. See NORTH DAKOTA; SOUTH DAKOTA.

Dakota, a family of American Indians. In their day the Dakotas extended from the evergreen region of the Great Lakes to the Rocky Mountains. In numbers, mental qualities, and influence, the Dakotas may be ranked as inferior to the Algonquins and Iroquois only. They appear to be related to the now extinct Catawba Indians of the South and to the Assiniboins of Manitoba. They were called Sioux by the French, but their native name is as given. Six tribes are recognized: the Santee, Sisseton, Yankton, Wahpeton, Yanktonnai, and Teton. These again are subdivided into a number of bands, some of the more prominent of which are the Ogillallah, the Omaha, the Osage, the Winnebago, Mandan, and Crow. When settlers began to pour into the upper Mississippi Valley the Chippewas in the evergreen region and the Sioux of the prairie were hereditary enemies. The Chippewas were skilled in the use of the birch bark canoe; the Dakotas in the management of ponies, of which they maintained great droves. A piece of buffalo hide served for a saddle; a thong of the

same for a surcingle; a twisted rope of horsehair, lashed to the lower jaw, served for a bridle. The Dakota lodge or tepee consisted of buffalo skins upheld by lodge poles meeting at the top in the form of a cone. Parkman, the historian, visited them in 1847. We make room for two characteristic paragraphs:

> The buffalo supplies them with the necessaries of life; with habitations, food, clothing, beds, and fuel; strings for their bows, glue, thread, cordage, trail-ropes for their horses, coverings for their saddles, vessels to hold water, boats to cross streams, and the means of purchasing all that they want from the traders. When the buffalo are extinct, they too must dwindle away.
>
> . . . . . .
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> The wild cavalcade that defiled with me down the gorges of the Black Hills, with its paint and war-plumes, fluttering trophies and savage embroidery, bows, arrows, lances, and shields, will never be seen again. The Indian of today, armed with a revolver and crowned with an old hat; cased, possibly, in trousers or muffled in a tawdry shirt, is an Indian still, but an Indian shorn of the picturesqueness which was his most conspicuous merit.

The later history of the Dakotas is that of other Indian tribes. First came white trappers and fur traders, then cessions of territory. Thousands of settlers thronged in driving away or exterminating game and forcing the Indians to retreat to more remote hunting grounds. The Dakotas were a warlike race and made at least two notable attempts to stem the tide of the invader. In 1862 Little Crow deemed the absence of the Great Father's young men in the Civil War a favorable opportunity. He organized a general outbreak in the valley of the Minnesota. Several hundred persons were massacred with frightful atrocities. The white troops appeared and the Indians fled to join their Western brethren. Of a number who surrendered themselves, thirty-eight were hanged from a single scaffold at Mankato. In 1876 the Dakotas made their last stand under Sitting Bull in the valley of the Little Big Horn in Montana.

Despite the attempts of the general government to care for the Dakotas on reservations, and really considerable payments in the form of cattle and money, their number has diminished steadily.

After 1880 the Federal government made every possible effort to care for the vanquished Dakotas. They were assigned to good reservations, and were made quite considerable payments in the form of cattle and money, they were taught as much scientific agriculture as they could assimilate, and they were otherwise cared for; but despite these efforts their numbers steadily decreased. Steps were taken some years ago to civilize the Dakotas through schools and churches. On their reservations at Yankton, Goodwill and Pine Ridge, schools and churches were established; the Bible was translated into the Dakota language. The response made by the Dakotas was no better and no worse than that made by other Indian tribes; the young people were halfheartedly interested and the old were uninterested; but the educational program has not been abandoned.

The Dakota names of the months are of interest not only for themselves, but for the hints they give of former Indian life:

January—Hard month. Crusty snow, ice.
February—Raccoon month. On a bright day the raccoon comes out.
March—Sore-eyes month. The dazzling snow and the smoke of the tepees caused sore eyes, even blindness.
April—Goose-laying month. Wild geese arrive.
May—Planting month. The squaws plant corn.
June—Strawberry month. Named probably by the children.
July—Choke-cherry month.
August—Harvest month. Corn.
September—Rice-gathering month.
October—Deer month. After the fall of leaves.
November—When-deer-shed-antlers month.
December—Drying-corn month.

See INDIANS; CUSTER.

Dallas, the county seat of Dallas County, Texas, and the second largest city in the state. It is situated on the Trinity River, about 33 miles from Fort Worth. The Atchison, Topeka & Sante Fè, the Texas & Pacific, the Southern Pacific and other railroads enter the city, and interurban electric lines connect Dallas with Fort Worth and Denison.

Dallas has a number of fine buildings, among them the Protestant and Roman Catholic cathedrals, Saint Paul's Sanitarium, the Carnegie Public Library, and a modern Union station. There are 700

acres of public parks, among them the fine State Fair Park, which covers 127 acres. In the suburb of Oak Cliff is the Female Seminary, and there are in the city two denominational colleges.

The city is an important distributing point for farm machinery and implements, is the chief manufacturing center in the state, and is one of the largest cotton markets in the world. Other important industrial plants are grain elevators, machine shops, foundries and meat-packing houses. The chief manufactures are cotton-ginning machinery, cotton, cottonseed oil, lumber, textiles and saddlery. The city is also an important distributing center for automobiles. Dallas is the headquarters of the eleventh district of the Federal Reserve banking system. It has a commission form of government. Population, 1920, 158,976.

Dalles, dalz, a French word, meaning slabs of stone. The name was applied by the French employes of the Hudson's Bay Company to a number of rapids where the water falls by low leaps from one bench of stone to another. It then became a general name for a series of rapids, as the Dalles of the Wisconsin, the Dalles of the St. Croix. The most noted dalles are those of the Columbia, river a region of rare scenic beauty.

Dalmores, Charles (1872-), a French operatic tenor, was born at Nancy, France. He studied successively the violin, the horn and the violoncello. In 1894 he went to Lyons as teacher of the horn at the conservatory there. It was then that the possibilities of his voice were discovered. He received training, and in 1899 made his debut at Rouen. In 1902 M. Dalmores appeared at the Theatre Royal in Brussels, and later at Covent Garden, London, and Bayreuth, Bavaria. He made his American debut in 1906 at the Manhattan Opera House, New York. In 1910 he was engaged by the Chicago Opera Company. M. Dalmores is considered one of the finest of French tenors. His principal roles are Julian in *Louise,* Vinicius in *Quo Vadis,* Sampson in *Sampson and Delilah,* Romeo in *Romeo and Juliet,* Herod in *Salome,* and Don Jose in *Carmen.*

Dalton, John (1766-1844), a modest English chemist, known as the author of Dalton's Atomic Theory. For a time Dalton was an instructor in a college at Manchester. During the last forty years of his life he supported himself by taking private pupils at sixty cents an hour. At one time John, being about to revisit his native village, bethought himself that he would bring his Quaker mother a pair of fine silk stockings. He accordingly purchased a pair marked, "Newest fashion"; but his mother's remark, "Thou hast brought me a pair of grand hose, John; but what made thee fancy so light a color? I can never show myself at meeting in them," rather disconcerted him, as to his eyes the hose were of the orthodox drab color. His mother insisted that the stockings were "as red as a cherry." John's brother upheld the "drab" side of the dispute; so the neighbors were called in, and gave their decision that the hose were "varra fine stuff, but uncommon scarlety." Being convinced that he did not see colors well himself, Dalton investigated the question, and found that many people are unable to distinguish all colors; some being deficient as to pink, others as to scarlet, etc. This defect of vision, or color blindness, is often called Daltonism.

Dalton's reputation rests on two principles known as the Atomic Theory:

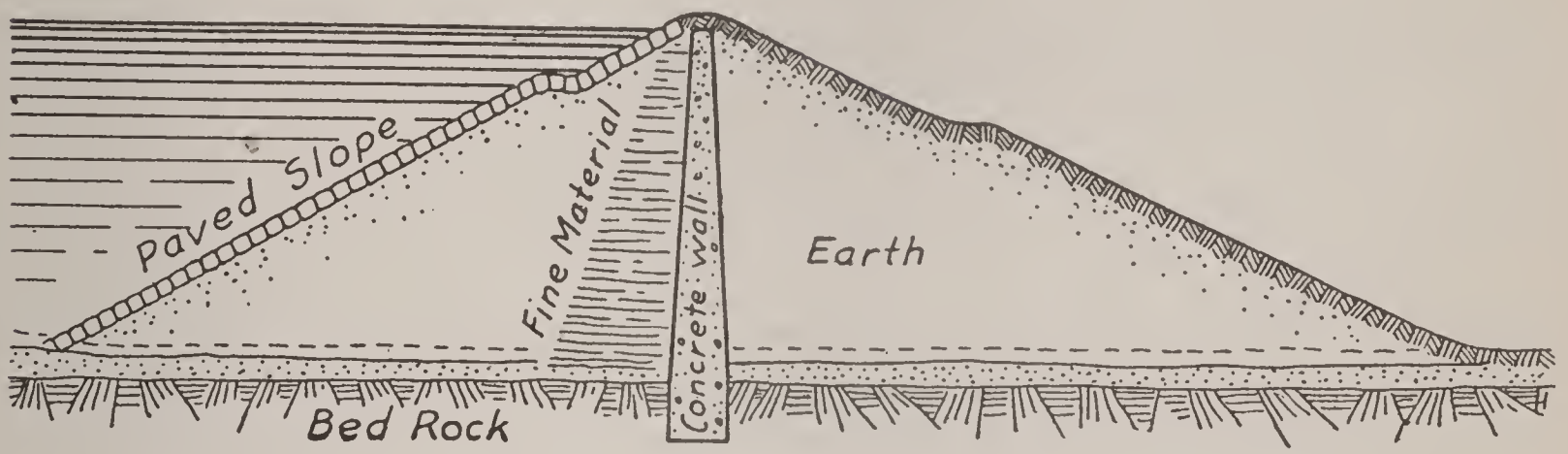
1. Every element is made up of atoms whose weight is constant.
2. Chemical compounds are formed by the union of the atoms of different elements in the simplest numerical proportions.

Interpreting these principles we say: Silver is an element, and is made up of atoms all alike, each having a weight that never changes. Water is a compound; two atoms of hydrogen unite with an atom of oxygen—never otherwise—to form a molecule of water. A molecule of water then weighs as much as two atoms of hydrogen and one atom of oxygen, never more, never less. The last statement seems self-evident, but it was not so in Dalton's day. Many yet held that heat had weight.

Dalton took some steps in establishing atomic weights. He took the weight of an

atom of hydrogen, whatever that might be, as a basis; but he left the work unfinished, and it is incomplete at the present time. In deference to modern scholarship, we should add that there is evidence that even atoms consist of smaller portions of matter.

Dam, a barrier built across a stream to raise the water level or to store water for use in irrigation, power or navigation. A barrier erected in a valley or other depression for the purpose of storing water in a reservoir is usually referred to as a reservoir dam. The construction of dams is recorded in all of history, and it may be that the beaver built dams before man.



EARTH DAM, CROSS SECTION

According to its size, and to the nature of the stream to be checked, the modern dam is constructed of earth, of timber, of timber and loose stones, of masonry of some kind, or, infrequently, of steel. The materials that are most used at the present time are concrete reinforced with steel, or stone and concrete, since these insure the greatest strength relatively to the cost of the dam. Some dams are built straight across the stream and some are curved upstream. All large modern dams are erected by competent engineers, and for that reason the number of dams that fail is small in comparison with the number built. The causes of failure recognized by engineers are, broadly, five—erosion, in the case of earth dams; crushing, in the case of masonry dams; sliding on the base or on some horizonal joint, that is, sliding downstream under the thrust of the water behind; overturning; and fracture caused by tension.

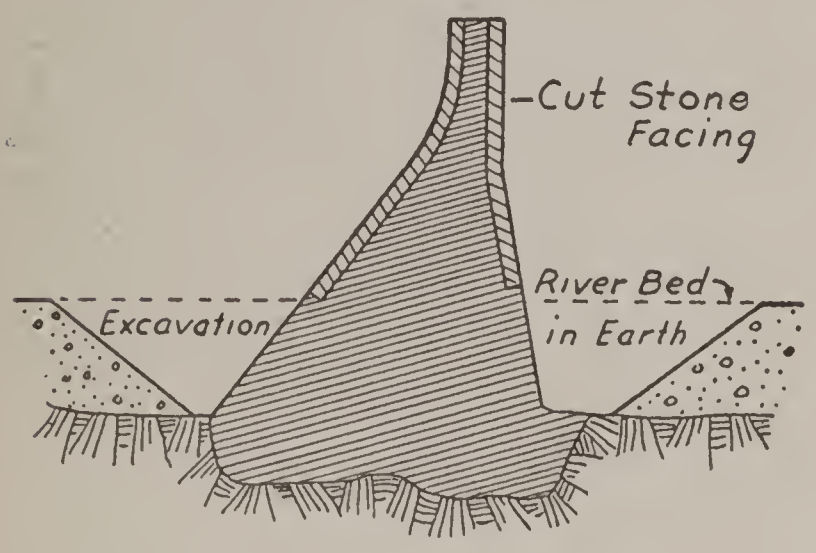
Protection against these is provided as far as may be by the passing of waste and flood water by way of outlets through (or around) one end of the dam; over the top of the dam by the construction of a crest that may be lowered in time of flood; or around the dam through a spillway or overflow channel that begins above the dam and comes back into the stream below.

EARTH DAMS. This type of dam is usually constructed of the natural deposits near the dam site. The earth is deposited in thin layers and compressed by rolling or otherwise; the layers are sometimes sprinkled in order that the earth may be pressed down to the greatest possible extent. Since earth cannot be made impervious to water, it is usual to pave the upstream or wet face of the dam, or to erect an upright water-tight wall in the center of the dam; both methods are not infrequently used in one dam. The water-tight wall or core is advantageous in that it may be—usually is—extended below the earth and into the bed rock, and beyond the ends of the artificial structure into the banks of the stream, thus preventing leakage and consequent erosion at these points.

The earth is sometimes conveyed to the dam site in carts, scrapers or on buckets running on a cableway, or by the hydraulic fill method, the latter consisting in bringing in the earth by means of flowing water. The Gatun Dam of the Chagres River on the line of the Panama Canal was in great part built by the hydraulic method.

That dams, no matter what material they are made of, are not built with vertical faces is known to almost everyone; but to illustrate the manner of their construction, the following dimensions may be noted.

The Gatun Dam is 2,019 feet thick at its base; at a height of 85 feet from the base it is 390 feet thick; and at the top, 115 feet from the base, it is 100 feet thick. By thus building the dam, somewhat in the shape of an inverted letter V, stability is insured.



Masonry Dam, Cross Section

Masonry Dams. Stone and concrete dams of large dimensions are of comparatively recent origin, since their construction involves forms of engineering that are of recent development. The manner of laying the blocks of stone varies, but they are never laid in regular courses, since this would make the dam liable to vertical and horizontal rupture. Concrete is employed to bind the stones into a solid mass. Stone that will offer the greatest resistance to crushing is used, and the blocks are set in such a fashion that those at the bottom will not be crushed by those at the top. In dams of this kind, the V form is often departed from, and high masonry dams frequently present the appearance of a right-angled triangle with the perpendicular on the upstream side. To the time of its completion in 1907, the highest masonry dam in the world was the New Croton Dam, built to increase the storage of New York City's water supply. It is located on the Croton River, 3¼ miles from its confluence with the Hudson. The maximum height of this dam is 297 feet, and its length at the top is 2,168 feet.

To the time of its completion in 1914, the highest dam in the world was the Shoshone Dam, on Clear River, near Cody, Wyoming. This dam was built for irrigation purposes by the United States Reclamation Service. It is 328 feet high, 108 feet thick from the river bed to the base, and only 10 feet thick at the crest. It is curved upstream. Another large, curved, masonry dam built by the Reclamation Service is the Roosevelt Dam, in Arizona. It has a maximum height of 284 feet. Still another is the Pathfinder Dam, in Wyoming. It, too, is a curved dam, and is 190 feet high.

Concrete Dams. These differ from the masonry dams mentioned above only in their composition. The highest dam in the world, the Arrowrock, is of concrete, and world (1923), the Arrowrock, is of concrete, and is built on the curved plan. It crosses the Boise River immediately above Boise, Idaho. It was built by the United States Reclamation Service as a part of the Boise irrigation project, embracing about 240,000 acres of land. This dam is 349 feet high. Another notable dam erected by the Reclamation Service is the Elephant Butte Dam, on the Rio Grande, in New Mexico. It is 306 feet high. In connection with the Colorado River Project (which see) there will be built a dam 600 feet high.

Rock Fill Dams. These are constructed of large stones loosely put into place and bound together with concrete. The slope walls are laid by hand, and the wet face is usually paved with concrete, planks, asphalt or steel. This type of dam is often built where stone is abundant and where transportation conditions make the use of concrete very costly.

Steel Dams. Dams are infrequently built of steel. The first steel dam of which record was made is the dam near Ash Fork, Arizona, built in 1897 or 1898 by the Sante Fe Railroad to supply its engines with water. It is made of triangular steel frames, to the upstream side of which are riveted steel plates. It is 46 feet high. A larger steel dam was built at Redridge, Michigan, in 1900-01; the steel frames of this dam, however, are set on concrete foundations. This dam is 74 feet high.

Timber Dams. These vary greatly in construction, and the timbers are usually

employed together with stone, concrete, etc. Sometimes piles are driven and earth is dumped against the upstream side of the piling. Timber dams are usually not high, and are of the overflow type.

The following is a list of important dams other than those mentioned:

Dam	Location	Height
Big Eddy	Canada	159 feet
Lagolungo	Italy	141 feet
Periar	India	180 feet
Lake Cheseman	United States	232 feet
Wachusett	United States	228 feet
Urft	Germany	190 feet
Cataract	Australia	192 feet
Cross River	United States	170 feet
Olive Bridge	United States	252 feet

See KEOKUK, IA.; HYDRO-ELECTRIC POWER; NILE; IRRIGATION; PANAMA CANAL.

Damages, the compensation which a court of law gives to one who has in one way or another been defrauded of his legal rights by a second party. This may be a right which the one complaining has shared with others, such as his inalienable right not to have his person or property interfered with; another is his right not to be injured by the negligence of another; and a third is that right he has gained by entering into some legal arrangement with another, such as contract or agreement.

To be accurate, the term "damages" is not applicable to all cases of a recovery of money for infringement of legal rights, but only such as call for an estimate by a court or jury of the injuries suffered, and the proper compensation to be made therefor to the plaintiff. However, legal authorities are agreed that although the law provides a legal remedy for every violated legal right, that remedy is not, in the very nature of things, an action for damages. Courts of equity concern themselves with remedies of a different order, such as injunction, the enforcement of contracts, etc., a question of damages usually being restricted to common law procedure. Even there, however, an action for damages will not always lie. To illustrate: if the controversy hinges on the sale of land or goods, its breach enables the injured party to rescind the transaction and place himself in *statu quo,* but not to sue for damages.

The principles upon which damages are measured by the courts vary according to the nature of the right infringed, and often of the act by which it was violated, and the adjudication of matters such as these are rather unsatisfactory. Thus, it is still the law in England, and was formerly in some parts of the United States, that a tenant who commits wilful waste or damage on premises, shall be compelled to pay three times the amount of the damage done, and if, after being given due notice by a landlord, he will not surrender the premises, he shall thereafter pay to such landlord double rent. To this class also belong damages of a vindicatory or exemplary character, where recovery may be had largely in excess of the actual damage or injury suffered, as in some cases of breach of promise of marriage, seduction, libel and slander. But this is a rather primitive method of meting out justice.

It is clear that the princple to be held in view in awarding damages should be that of restitution rather than satisfaction: the restoring to the injured party the property of which he has been deprived, or giving to him due compensation for any injuries suffered, and this is the principle now generally followed.

Damascus, the capital of former Syria, is said to be the oldest city in the world, and was in the possession of the Turks from 1516 until September, 1918, when it was captured by the British forces under General Allenby. Damascus is now a part of the Government of Damascus, one of the four territories or governments into which former Syria has been divided, and which is a French mandatory. Jerusalem is 150 miles from Damascus and 40 miles nearer the sea. Damascus is a glittering city, and most picturesque with its mosques, minarets and palaces, interspersed with palms. A mountain stream with a cold, swift, deep current, the Abana, rushes eastward to a plain which its waters have converted into a paradise. Three hundred square miles, and a hundred more along the ancient Pharpar, watered by canals and pipes, are a veritable garden of fertility.

Damascus has been a western station of the great caravan trade from time im-

memorial, and is a busy city today. Bazaars,—narrow, roofed lanes lined with merchants' stalls, offer European clothes, Persian carpets, French ribbons and silks, Sheffield knives, Cashmere shawls, Mocha coffee, Dutch sugar, and Bagdad tobacco. The city manufactures swords, cloth, silks, cloaks, ornaments, guns, and household utensils. Five thousand hand looms clatter away; 10,000 people are engaged in weaving. Now that Damascus has a railway, a renewal of trade is growing up with the Arabs of the surrounding country, and several million dollars' worth of foreign goods are bought annually. The sights of Damascus are the swift river, the orchards, the bazaars, the khans, the mosques, and mansions with mud exteriors and open courts within. These courts are adorned with marble fountains, lemon trees, fragrant shrubs, and climbing vines. They are surrounded by apartments with marble floors, silk-cushioned divans, and ceilings in gilt arabesque. The city has a population of about 150,000, chiefly followers of Mohammed. About 16,000 Christians and 6,000 Jews are tolerated, but they are required to live in their own quarters. Once a year a great caravan convenes to visit the tomb of the prophet at Mecca, and to do a little trading at the Mecca fair. Railroad connections are cutting off this business; but the faithful still gather at Damascus for a four months' pilgrimage. Their setting out and their return are times of pomp and holiday.

The early prominence of Damascus as a manufacturing town and a business center may be inferred from several words well fixed in our vocabulary. A Damascus blade is a sword of the finest temper known. Damascus steel is still a name for steel of a peculiar twist and toughness. Damask linen is the type of perfection for beautiful linens with woven figures. For damson plums we are indebted also to Damascus.

On their return to Europe the Crusaders brought home many valuable ideas from Damascus. Damascus is now getting ideas in return from the western nations. A recent consular report gives an interesting account of a modern American steam threshing rig: Its recent triumphal march through Damascus stirred the "White City of the East" from center to circumference. On its way into the country it broke down bridges innumerable, but pulled itself and train out of the creek beds beautifully. It had the honor of being started on its pioneer career in the presence of the governor-general of the province, the field marshal in command of the fifth army corps, and many other gentlemen of high station in Ottoman civil and military life. With its self-feeder, automatic bagger, straw stacker, etc., it is a marvel of ingenuity, and its service to this country, in blazing the way for labor-saving machinery, with its accompanying amelioration of industrial and social conditions, in a region east of Mount Hermon, where people live and work as did their forefathers when Abraham crossed their pastures with his Chaldean flocks, is beyond estimation.

See ASIA MINOR; SYRIA; TURKEY; CRUSADES; WINDMILL.

Damask, specifically, a twilled linen fabric, plain or figured, in use for tablecloths and table napkins, centerpieces, doilies, etc. The name damask designates the weave, rather than the material. The lustrous quality of all damask is due partly to what is known as the satin weave, which means that the warp is brought to the surface to a greater extent than in plain weave. A weft thread, for instance, may pass under sixteen warp threads, over one, under sixteen, and over one again. In figured damask, this is, of course, more or less interrupted by the pattern.

The figures of the pattern are produced by bringing the warp threads to the surface in groups, allowing them to be skipped by the weft threads, according to a regular design. The warp and woof threads thus lie at right angles to each other on the surface of the material, in more or less broad groups. The play of light upon the fabric defines the pattern from the ground. In a plain color, the angle at which the light strikes the surface determines whether the pattern appears lustrous and the ground dull, or the pattern dull and the ground lustrous.

Originally damask was a silken fabric. It was woven in colors, as well as plain, and sometimes with gold and silver threads. The weaver used a draw loom,—so called from the fact that certain of the warp threads must be drawn up to allow the weft threads to skip them. This was

done by hand, cords being attached to the separate warp threads. Often the weaver had a boy to assist in drawing these threads. From this the contrivance was sometimes called the "draw-boy loom." The draw loom originated, it is thought, in China, where the village weaver still weaves damask silk on a rude contrivance that may well have been the forerunner of the modern damask loom. The Hindus were celebrated for their damasks. Babylon became a weaving center. At one time a Babylonish garment had the reputation in the oriental world that Parisian gowns now have in modern society. A knowledge of the draw loom was one of the numerous bits of knowledge brought back to Europe by the Crusaders. During the Middle Ages the great artists of France, Germany, and the Netherlands considered it by no means beneath their dignity to contribute original, and, it is needless to say, beautiful designs for damasks. The Jacquard loom has superseded the draw-loom, performing automatically operations formerly requiring great skill and patience. This has materially lowered the cost of damask linens.

The name, damask, is from Damascus, Syria. The silk weavers of this city attained so great perfection in the manufacture of this textile that the name was given to the fabric without regard to the place of its production. Since the sixteenth century, this name has come to be applied to any material woven after the manner of the first damask, but at present, if used with no qualifying word, damask implies a linen material.

Linen damask is known as "double" or "single," according to the number of threads brought to the surface in a group, in applying the "satin" principle of weaving. In double damask eight threads to one "tied down" appear; in single damask four threads to one tied down. In double damask the finest grades of linen are used, and the work is usually done on hand-looms. The terms double and single came probably from the fact that in double damask the pattern is almost equally distinct on the two sides. Coarse linens would not look well woven "double," as the quality of the thread would be too conspicuous.

The linens of Ireland, Scotland, Germany, and Austria are all notable for the beauty of the material and weave. French linen is probably the best of all, its fineness, beauty of design, and superior "satin" effects making it especially desirable, but very expensive.

See SATIN; TWILL.

Dame Durden, in an old English song, a famous housewife. In Dickens' *Bleak House* the careful and conscientious Esther Summerson is affectionately called "Dame Durden" by Mr. Jarndyce, owner of "Bleak House."

Damien, da'mi-en, **Father,** a Belgian priest noted for self-sacrificing missionary work in the Hawaiian Islands. In order to stamp out leprosy the government of these islands requires all lepers to retire to the little island of Molokai as soon as the first sign of leprosy is seen. Even young mothers are obliged to leave their homes and children. No return is permitted; no further intercourse with relatives is possible. As leprosy eats away the extremities of the body first, and creeps toward the vital organs slowly, these unfortunate wretches drag their rotting limbs about for years, it may be, before death comes to their relief. This young priest was so stirred by the misery of the exiled colony, several hundred in number, that he cut himself off from the outside world and went into voluntary residence among them. From 1877 until the time of his death, twelve years later, he toiled heroically, feeding the hungry, dressing loathsome wounds, comforting the dying, and burying the dead. From the very nature of his work Father Damien knew he would become a leper sooner or later. After eight years at Molokai spots of leprosy appeared on his hands and feet. He was a doomed man. At his death a bishop-missionary, resident in Honolulu, the capital city of the islands, wrote a note to a friend belittling the priest's work, defaming his character, and styling him a "coarse, dirty, bigoted, headstrong man." This letter was published in the *Sydney Presbyterian*. October 26, 1889, and fell into the hands of Robert Louis Stevenson, who was well acquainted with the facts. Stevenson was indignant, and addressed the

bishop an open letter, since published under the title of *Father Damien*, in which he contrasts the luxury, sloth, and jealousy of the bishop with the poverty, toil, and sacrifice of the priest. This remarkable article is one of the keenest pieces of invective in the English language. The prominence of the writer, the merit of the topic, and the skill of the writing render the incident one of note. The services and the self-sacrifice of Father Damien are commemorated in an imperishable bit of literature and cannot now be forgotten. See LEPROSY.

Damocles, a courtier of Dionysius, the tyrant of Syracuse. He lived in the first half of the fourth century before Christ. He had so much to say of the grandeur and happiness of kings, and was so given to flattery, that Dionysius prepared a surprise for him. Inviting him to sup, and placing him in a royal seat, he caused him to look upward in the very midst of the hilarity to behold a keen sword suspended above his head by a single hair. This quite altered Damocles' view of royal life, and gave him a sudden sense of the apprehension of danger under which rulers live. An allusion to the sword of Damocles is a well worn figure used to denote an impending danger that takes away the power of present enjoyment. See DIONYSIUS.

Damon and Pythias, or **Phintias,** two noble citizens of Syracuse, noted for their supreme friendship. Phintias, having incurred the displeasure of the tyrant Dionysius, was condemned to die. He begged to be allowed to go home to put his affairs in order. This was agreed to, Damon taking his place in prison. In some way Phintias was delayed. In spite of the jeers of the populace Damon defended his friend's absence with the utmost confidence in his fidelity. Phintias arrived just as Damon was being led out to die in his place. He cast himself into his friend's arms, demanding the latter's instant release and his own execution. Each begged to die for the other. The tyrant was so affected by this constancy that he set them both free, and asked to become a third in their fellowship. The friendship of these two has been the subject of many an allusion and the theme of the drama in more than one language.

Damps, a name given to certain poisonous gases formed in mines. Miners distinguish two kinds—choke damp and fire damp. Choke damp is composed largely of carbonic acid gas, and is found in the lowest levels. It will extinguish the flame of a candle. No one can live in it for a long time. Fire damp also contains carbon, combined with hydrogen and mixed with atmospheric air. It explodes in contact with a flame. Miners going to their work with lighted candles or lamps not infrequently run into fire damp before they are aware of it. Violent explosions result in the death of many men. As early as 1815 Sir Humphry Davy invented a safety lamp which consisted essentially of a cylinder of wire gauze surrounding the flame. Fire damp passes through the meshes of the gauze and burns within with a feeble blue flame. The flame of the lamp cannot pass out through the gauze without being cooled to such a degree that it cannot ignite the dangerous gases. See DAVY, SIR HUMPHRY; SAFETY LAMP.

Damrosch, däm′rŏsh, **Leopold** (1832-1885), a Prussian musician. He was educated at the University of Berlin for the practice of medicine, but finding music more to his taste devoted his time to it, and in 1855 became a concert violinist. After filling the position of orchestra director in Posen and Breslau, Prussia, he came to New York in 1871, becoming director of the Arion Society. In 1884 he succeeded in introducing German opera in New York City. Damrosch contributed to musical magazines, and produced many songs, concertos and cantatas. These compositions are meritorious but are not the work of genius.

Damrosch, Walter Johannes, son of Leopold, was born in Germany, and in 1862 came to America with his father. He also became a musician, conducted symphony societies in New York, and in 1900 became conductor of the New York Philharmonic Orchestra, one of the leading organizations of its kind in America. He is the author of various musical compositions.

Damson, a variety of the common domestic plum or prune. It is known also as the Damascus plum; in fact, damson is a contraction of the adjective damascene, meaning of Damascus. This plum is supposed to have been brought to western Europe by the Crusaders returning from the East. It was introduced from England into America. The fruit is a small, black, dark bluish, or purple plum. The damson is surpassed by other plums for table use; but it is prized by housewives for preserves. The fruit in its native state has a puckery taste; but when cooked, it makes jams, marmalades, and the richest of preserves. See PLUM; DAMASCUS.

Dana, Charles A. (1819-1897), an eminent American journalist. He received his education at Harvard. He became a member of the famous Brook Farm Community, and was associated with George Ripley and Parke Godwin in the editorship of the *Harbinger*. In 1847 he was made managing editor of the New York *Tribune,* a position which he held up to the time of the Civil War. In the meanwhile he colabored with Ripley in projecting and editing *Appleton's American Encyclopedia* in sixteen volumes. During the Civil War he was for a time assistant secretary of war. His was a busy, useful life, but he is remembered chiefly as editor of the New York *Sun* from 1868 onward. He belongs to the group of noted New York editors, including Greeley and Bryant. His editorials were noted for brilliancy; but toward the end he fell into a bitter partisan, pessimistic vein, seeming to think the world going wholly wrong. He failed on that account to retain his influence.

Dana, James Dwight (1813-1895), an eminent American geologist. He was born at Utica, New York. He was graduated at Yale in 1833. In 1838 the United States government sent an expedition under Lieutenant Wilkes to explore and survey the southern seas. Mr. Dana was fortunate enough to be appointed the official mineralogist and geologist. Later he became Silliman professor of natural history and geology at Yale. Professor Dana contributed many articles to scientific journals. He was the author, also, of a number of textbooks, including a *Manual of Geology, Textbook of Geology, The Geological Story Briefly Told,* and *Manual of Mineralogy.* He also wrote a volume on *Coral Reefs and Islands.* He applied the term "Archaean" to the oldest rocks and proposed that the Archaean Age be recognized as the earliest geologic period. His classification has been adopted very generally by American geologists.

Dana, Richard Henry (1815 - 1882), an American jurist and author, was born at Cambridge, Mass. He entered Harvard University in 1832, but an affection of the eyes caused him to give up his studies. He shipped as a common sailor on a voyage to California, via Cape Horn, and his experiences on this voyage are embodied in the remarkable book *Two Years Before the Mast,* a book that will probably always be among the classic stories of the sea. Later he returned to his profession, and finally became an authority on international law.

Danaë, dan'a-e, in Greek mythology, daughter of Acrisius, king of Argos. Acrisius had been warned by an oracle that his daughter's child would cause his death. To avoid the fulfillment of this prophecy he decided to prevent his daughter's marriage, and therefore shut her up in a brazen tower built for this express purpose. But Zeus was more powerful than Acrisius. He had seen and admired the beautiful Danaë. Now he changed himself into a shower of gold, and in this form shone into the tower and wooed the captive. Perseus, destined to become the hero of many famous adventures, was the son of Zeus and Danaë. Danaë has been a favorite subject with artists.

Danaides, da-nā'i-dēz, in Greek legend, the fifty daughters of Danaus. They accompanied their father to Argos, but were followed thither by the fifty sons of Aegyptus, who sought them in marriage. The father consented to the marriage, but provided each daughter with a dagger, commanding her to murder her husband. They all obeyed except Hypermnestra, who allowed Lynceus, her husband, to escape. The Danaides were purified from their crimes by order of Zeus. Nevertheless, so the legend runs, they were punished for it

after death, for in Hades they were doomed to draw water in sieves forever. See DANAUS.

Danaus, dān'a-ŭs, in Greek legend, a grandson of Poseidon. He was the founder and king of Argos. According to the legend, he was a native of Chemnis in Upper Egypt. Fearing that his brother Aegyptus and his sons were in league against him, Danaus with his fifty daughters left his native land and, after various adventures, settled in Greece, becoming king of Argos. See DANAIDES.

Danbury, Conn., one of the county seats of Fairfield Co., is 64 miles north-northeast of New York City. It was settled in 1684 under the Indian name Pahquioque, its present name dating from 1702. In this city are manufactured approximately 75 per cent of the stiff hats made in the United States. Soft hats and hats in the rough are also made here. Almost all the factories in the city are engaged in this industry, which began here in 1780. There are factories engaged in the preparation of fur for hats, mills producing silk for hats and factories making hat boxes. P. T. Barnum, the showman, was born in that part of the city that was incorporated under the name of Bethel in 1855. The educational institutions include a State Normal School, a high school and graded schools. Population, 1920, 18,943.

Danbury News Man, The, a sobriquet of James Montgomery Bailey, an American humorist and editor. He was born in Albany, New York, in 1841, and died in Danbury, Connecticut, 1894. He founded the *Danbury News* and was its editor for years. His jests and humorous articles were widely quoted. He wrote *Life in Danbury, Danbury News Man's Almanac, They All Do It,* and *The Danbury Boom.*

Dance of Death, a grotesque representation in which the figure of Death takes the lead, followed by dancers of all ages and conditions. The Dance of Death had its origin in Germany in the fourteenth century. It was, in this first instance, a sort of morality play consisting of dialogues between Death and his followers. It was presented by a religious order with the purpose of reminding the living that death had power to wreck all human plans. The presentation was repeated in France. It became extremely popular, not only in Germany and France, but in Spain and England. It seemed to possess a wonderful fascination. Artists soon took up the idea. The celebrated Hans Holbein produced fifty-three sketches for engravings suggested by the Dance of Death. The original drawings are at Petrograd.

Dancing, stepping to music in a gliding or lively fashion. It is believed that dancing of some sort is practiced by all peoples. Among the Mohammedans, the Hindus, the North American Indians, and many races, the dance is a religious exercise. Thus we hear of the war dance, the rain dance, the ghost dance, the medicine dance, the buffalo dance, and many others. The Greeks danced in honor of their gods and in their gymnastic exercises. King David danced before the Ark of the Covenant, but the Romans deemed it undignified for a man to dance. The English Cavaliers and the Virginians danced, but the Puritans of England and the New England colonists deemed dancing a sin. Many families and churches still frown on the practice—especially dancing in a promiscuous assembly of strangers. Of modern nations, those of southern Europe are the more famous for dancing. The fandango is a rustic Spanish dance; the minuet and quadrille are French; the galop, German; the polka, Hungarian; the waltz, Bavarian; the schottische, Bohemian; the reel, fling, and strathspey are Scottish; the breakdown is African; the jig, Irish; and the ballet, a pantomime dance, is thought to be Roman. See PURITAN.

Dandelion, a common perennial herb of the composite family. From the toothed appearance of the leaves, the French gave it the name *dent de lion,* whence our name. It appears to grow wild over Asia and Europe. It came to this country with garden seeds, yet seems to be a native of the Rocky Mountains. Children make garlands of its blossoms; the wind makes playthings of its seed; the housewife uses its leaves for greens; the farmer execrates it in his meadows; people who move into a new country long for its face; and the

poet—each person looking at the dandelion in his own way—says:

Dear common flower, that grow'st beside the way,
Fringing the dusty road with harmless gold,
First pledge of blithesome May,
Which children pluck, and, full of pride uphold,
High hearted buccaneers, o'erjoyed that they
An Eldorado in the grass have found,
Which not the rich earth's ample round
May match in wealth, thou art more dear to me,
Than all the prouder summer-blooms may be.
—Lowell, *To the Dandelion*

Daniel, one of the Old Testament prophets supposed commonly to have been the author of the book of Daniel, although certain critics believe that work to have been produced by some unknown writer at a much later period. When, in 605 B. C. Nebuchadnezzar, King of Babylon, besieged Jerusalem for the first time, Daniel, a Hebrew youth of a distinguished family, was carried with other captives to Babylon. The book of Daniel tells the story of the conscientious youth, and of his education and life at the Babylonian court, of his utter obedience to the law in which he had been trained, and of his absolute faith in the God of his fathers. The story of Daniel in the lion's den and of his three friends, Shadrach, Meshach and Abednego in the fiery furnace are familiar. Daniel's triumphant faith, his strength of character, his rare abilities as a man, and his power and boldness in his dealings with the king won the favor of Nebuchadnezzar, who honored him and "made him ruler over the whole province of Babylon and chief of the governors over all the wise men of Babylon." The prophetic visions of Daniel are recorded in the last six chapters of the book that bears his name.

Daniell, John F. (1790-1845), an English scientist. Born in London. Professor of chemistry in King's College, London, 1831. Daniell invented the first form of electric battery by which a steady current could be obtained for a considerable length of time. The Daniell cell consists of a copper plate immersed in a solution of copper sulphate in an outer glass jar, and a zinc plate immersed in sulphuric acid in an inner porous cup. The gravity cell used in telegraph stations is a modification of Daniell's, which dispenses with the porous cup. Daniell's *Meteorological Essays* was the first attempt made to account for all the then known phenomena of the atmosphere. He also published an essay on *Artificial Climate.* The Royal Society conferred upon him all of the medals, *viz.,* three, which they had at their disposal.

Danish Literature. See LITERATURE.

Dante, dăn'te, **Alighieri** (1265-1321), the most eminent Italian poet. He was born at Florence and died at Ravenna. His mother was a widow of some means and social standing, able, it appears, to give him a liberal education at Bologna, Padua, Naples, Paris, and Oxford, the leading universities of that early day. He preceded Raphael and Michelangelo by two centuries, and Shakespeare by three. In his early manhood he participated in the civil discord and factional wars which drenched the streets of his native city in blood. He was married to a lady of rank, and had seven children. About 1302 his property was confiscated and he was banished from Florence to wander a beggar.

When a mere youth he fell in love with a beautiful girl named Beatrice, whose early death left him to mourn. When banishment from his beautiful home and beggary came upon him, he settled into melancholy and wrote his *Divine Comedy.* In this poem, the greatest literature of the Middle Ages, Dante represents himself as traveling through hell and purgatory and heaven. The shade of Virgil conducts him through the dark portal, over which was written "All hope abandon, ye who enter here," into the Inferno, the region of the damned. One of the most impressive parts of the poem is a brief description of the world's great criminals undergoing torture there. From the Inferno Dante is conducted upward to Purgatory, a mountain rising in midocean, on the opposite side of the globe. Ascending from terrace to terrace, where mortals are undergoing endurable and temporary punishment preparatory to final happiness, they reach at last the top of Purgatory, where they are stayed by a sheet of flame. Here Dante's conductor bids him farewell, telling him that Beatrice is on the other side. He

plunges boldly through and comes out in a paradise of forests, flowers, soft zephyrs, fountains, songs of birds, and music. Beatrice, divinely radiant, more beautiful even than the Beatrice of his grief, guides him from scene to scene, bidding him look back now upon earth, indescribably mean and insignificant in the dark and gloomy distance. Amid the softest melody they move ever upward, entering circle within circle, until they come before the Great Throne, in whose presence all eyes are fixed on the triumphant Redeemer, forgetful of self and forgetful of the sorrows and ills of earth, mindful only of Him who is the source of light and love. Here closes the Divine Comedy, "one of the greatest monuments of human genius." Boccaccio, a friend who knew Dante well, has left the following description:

> Our poet was of middle height; his face was long, his nose aquiline, his jaw large, and his under lip protruding somewhat beyond the upper. His eyes rather large than small; his hair and beard thick, crisp, and black, and his countenance sad and pensive. His gait was grave and gentlemanlike, and his bearing, in public or private, wonderfully composed and polished. In meat and drink he was most temperate. Seldom did he speak unless spoken to, though he was most eloquent. In his youth he delighted in music and singing, and was intimate with all the musicians and singers of the day. He was of marvelous capacity and the most tenacious memory; inclined to solitude and fond of study when he had time for it.

Danton, George Jacques (1759-1794), a leader of the French Revolution. He is described as a man of gigantic stature, with a voice that fairly shook the dome of the Assembly with its roar. He speedily became one of the small circle that brought Louis XVI, Queen Marie Antoinette, and scores of royalists to the guillotine. When the Prussians invaded France, Danton's courage saved the day. He and Robespierre fell out and distrusted each other. Each sought the other's downfall. Danton was arrested on a charge of conniving to bring back the royal family. He went stoutly to the fate to which he had condemned others. He gloried to the last in his part in the revolution. He gave expression to two regrets; one that he had been outwitted by Robespierre, the other that he should never see his wife again. See ROBESPIERRE; FRENCH REVOLUTION.

Danube, the second river of Europe. It rises in the Black Forest, flows through southern Germany, across the fertile plains of Austria-Hungary, through the famous Iron Gate of the Danube, and on to the Black Sea. Its course is 1,750 miles as the crow flies, or 2,000 miles of delightful windings by forest, vineyard, and field, at the foot of castled crags, by old Ulm, past the canals of imperial Vienna, beneath the bridges of Budapest, and under the white walls of high Belgrade, until lost in the vast lowlands at its mouth. It passes five capital cities. In its course it receives 500 affluents. In volume it is the chief river of Europe. It carries 67,000,000 feet of earth to the Black Sea annually. It has advanced its delta ten miles since the day of Roman occupation. Immense sums of money have been expended in removing rock from the channel and in deepening the mouth. Navigation is open by treaty to the ships of all nations. Large steamers ply on the lower course. Flat-bottomed, shallow-draft boats ascend as far as Ulm. Sixty tributaries are navigable. Though not so celebrated in story and in song as the Rhine, the "Blue Danube" is one of the picturesque rivers of the world, especially in that part of its course above Belgrade known as the Iron Gate, where mountains press in on either hand. The Danube was for many decades the boundary of the Roman Empire. It has seen its full share of the noted events of European history.

Danville, Illinois, the county seat of Vermilion County, is a flourishing city located on the Vermilion River, 120 miles south of Chicago. The most important industry is the mining and shipment of coal, but the city also contains iron foundries, planing mills, smelters, glass works, extensive brick works and other factories of various kinds. It is reached by several steam railroads and electrical traction lines, and contains the car and machine shops of one of the railroads. Hard roads, either brick or concrete, connect Danville with every village in the county, also with Chicago, St. Louis and Springfield. A na-

tional soldier's home is located here and it also has a first class high school, several churches, a Carnegie library, a Young Men's Christian Association building and many fine business blocks. The population in 1900 was 16,354, but in 1920 had increased to 33,776.

Danville, Va., a prosperous city situated in the famous Piedmont section of Virginia. It is on the Dan River, 140 miles southwest of Richmond. The city rises from the river on a gradual slope to a height of from 400 to 600 feet and commands a view of the beautiful surrounding country. It does an extensive trade in loose-leaf tobacco, being among the world's largest markets trading in this article. The Dan River furnishes power for flour-mills, a furniture factory, a cheroot factory, cotton mills, and other industrial plants. The city contains the Danville Military Institute, for boys; Randolph Macon Institute, for girls; Amrytt College, for girls, and fine public schools. Danville was for a short time the capital of the Southern Confederacy during its last days. Population, in 1920, 21,539.

Danzig, or **Dantzic,** or **Dantsic,** formerly a commercial city of Prussia, on the Vistula River, three miles from the Baltic Sea, now a free city with a constitution dating from the end of 1920. By the Treaty of Versailles, Poland is allowed unrestricted use of the port, the free city and Poland now forming one customs area under Polish regulations. Previous to 1793 it was Polish territory. In early days it was one of the four leading cities of the Hanseatic League, and had a large overland trade by packhorses and flatboats with the caravan routes of Asia. The goods thus obtained were conveyed westward by way of the Baltic. It is now a fairly prosperous town of 160,000 inhabitants, with a large export trade in lumber, beet sugar, and grain. The grain warehouses rival those of Buffalo. It is the chief source of the supply of amber and amber ornaments. Ships are built here. There are also large mills, breweries, cordage works, and paper mills. It is a strongly fortified military post. It is still surrounded by its old walls and preserves its medieval appearance. The principal edifice of interest is the cathedral. Its massive tower is 248 feet high. The bell weighs six tons. A beautiful vaulted interior is supported on twenty-eight pillars. A fine city hall dates from the fourteenth century. Its beautiful slender spire contains one of the sweetest chimes in Europe. The houses are chiefly of brick and sandstone, set gable end toward the street. The narrow streets, lined with lofty, richly decorated gables, have an antiquated look. See HANSEATIC LEAGUE.

Daphne, in Greek mythology, a nymph beloved and pursued by Apollo. But, according to the legend, Daphne turned a deaf ear to Apollo, and fleeing from him, she prayed Zeus to protect her, when Apollo was about to fold her in his arms. Zeus heard Daphne's prayer and turned her into a laurel tree. From thenceforth, so the myth runs, the laurel became the favorite tree of Apollo, and was consecrated to him.

Darby and Joan, där'by and jōn, a married couple, John Darby and wife, said to have lived in the eighteenth century in the village of Healaugh, in the West Riding of Yorkshire. They were famous for a long and happy married life. The couple were celebarted in a ballad called "The Happy Old Couple," by Henry Woodfall. The names are sometimes used figuratively to describe a peaceful but uneventful married life.

Dardanelles, the ancient Hellespont, a strait connecting the Aegean Sea with the Sea of Marmora; and thus, via the Bosporus, affording direct access to the Black Sea, to Bulgaria, Rumania, Russia, Georgia, Armenia, and to points connected by rail with the regions on the Caspian Sea. Since the beginning of history, and especially since the founding of the Byzantine Empire, the strategic importance—military and commercial—of the Dardanelles has been the basis of much contention among the European powers, and between them and Turkey. When, in 1453, the Byzantine Empire fell, control of the Dardanelles passed to Turkey. A British fleet in 1807 forced its way through the strait to Constantinople, and was the first hostile fleet ever to appear before that city. This feat

led more or less directly to an agreement between Great Britain, Russia, Prussia, Austria, France and Turkey that, without the latter's consent, no foreign warship should pass through the strait. This agreement was renewed in 1856, 1871 and 1878, but in 1891 Russia was granted passage for her so-called "volunteer fleet." As soon as the World War opened the Dardanelles became the scene of very bitter

The Dardanelles and Sea of Marmora

fighting. The allies landed troops on the Gallipoli Peninsula, but were forced to withdraw after eight months. Permission to occupy the strait was demanded by the allies as one of the armistice terms, and in November, 1918, an allied fleet sailed through to Constantinople. The Kemalist victory over the Greeks (September, 1922), however, again put Turkey in possession on the European side, and the historic strait is still a potential cause of war.

Dargomyzhsky, Alexander Sergeyevich (1813-69), a celebrated Russian composer, who, with Glinka, founded the Russian National School of Music. Though speechless to his sixth year, he showed a marked fondness for music and was taught piano and violin. He soon became known as a pianist and violinist, and decided to devote himself to music as a career. He collaborated with Glinka in the *Life of the Czar,* and later wrote the opera *Esmeralda,* based on the *Hunchback of Notre Dame,* which was produced in Moscow in 1847. He had begun the cantata *The Triumph of Bacchus* in 1840, but it was not finished and produced until 1868. During this period Dargomyzhsky had changed *Esmeralda* materially, giving it a strong national spirit, and when it was revived it met with unbounded success. However, he grew more and more retired and devoted himself to giving vocal lessons and composing songs, some 100 in number. He also wrote three orchestral works: *Kazachok, Finnish Fantaisie* and *Baba-Yaga.* During this period his *Russalka,* written in 1855, became well known and won high praise. *The Stone Guest,* his last work, left unfinished, was completed by Rimsky-Korsakoff. During the last part of his life Dargomyzhsky became an ardent follower of Richard Wagner.

Darien, dā′re-en, a gulf forming the most southwesterly extension of the Caribbean Sea. The isthmus, extending from Colombia to Central America, is now known by the name of Panama.

Darius, the title of several Persian monarchs. It is not a personal name, but is akin in meaning to emperor, pharaoh, czar, and caesar. Darius I was one of the greatest Persian kings. He ruled 521-486 B. C. He organized the great Persian empire by dividing it into twenty provinces. Eeach province was ruled by a satrap. In order that the satrap might not have the means to set up an independent kingdom, the military force of the province was placed in charge of a commander, who reported to Darius independently. There was also in each province a royal secretary who reported on affairs. A complete system of taxgathering was established. Ex-

cellent post roads were built, along which couriers, peasants and their donkeys, endless caravans, and armies might pass. The longest—the east and west road from Sardis to Susa—was 1,500 miles in length. Babylon attempted to revolt, but in vain. The empire was reduced to order in every direction. The first great work of Darius may be summarized as the most perfectly organized Asiatic government the world has ever seen. It was essentially the form of government of the Turkish Empire today.

His second service was the repulse of the barbarian tribes of the north. Just what these were, whether Hun, Turk, or Tartar, no one knows. Under the name of Scythians, they had pushed their way repeatedly into the heart of western Asia—some authorities say even as far as Egypt. Darius led immense armies against them and set up stone pillars to mark the boundaries within which they were forbidden to enter. Following the subjugation of Babylon this great king led an immense host across the Bosporus on a bridge of boats, to attack the Scythians in the southern steppes of what is now Russia. Thrace was added to the empire, thus bringing Persia within Europe to the very foot of the mountain barriers of Greece. Nevertheless the barbarians were effectually checked and repulsed from the frontier of civilization.

The third great enterprise of Darius ended in disaster. Persian arms had annexed India as far as the Indus. The Mediterranean coast was now Persian from the Nile to the mountains of Thessaly. The Aegean Sea, the center of Greek activity, was practically "a Persian lake." Whether or not Darius had a previous intention of attacking Greece is not known, but the Greek cities on the coast of Asia Minor revolted. Darius reduced them with fire and sword, and in 492 B. C. sent an army and a fleet under Mardonius to subjugate the Greeks. The barbarians of Thrace mishandled his army and a storm off Mount Athos wrecked his ships. In rage he sent messengers to the Greek cities to demand earth and water, the symbols of submission. Many of the weaker cities complied. Athens and Sparta threw the envoys into pits and wells and told them to help themselves to all the earth and water they cared for. The story of the great king's discomfiture may be read under MARATHON.

Dark Ages, a name given to the fifth, sixth, seventh, and eighth centuries. During the early part of this period the civilization of the Romans was overturned by invasions of Franks, Goths, and other tribes. Schools became almost extinct. Rulers cared little for learning; literature, save among the monks, was a forgotten subject. For centuries it seemed as though the western world forgot faster than it learned. Students in particular bewail the loss of many art treasures destroyed by the rude soldiers of the north rather through ignorance than through malice. See CHARLEMAGNE.

Darling, Grace Horsley (1815-1842), an English girl celebrated for her heroism in saving passengers from a wrecked steamer. She was born in Northumberland. Her father, William Darling, was keeper of a lighthouse on Long Stone, one of the Farne Islands. The event which made her famous occurred in September, 1838. Very early one morning the lighthouse keeper descried the wreck of a vessel, which proved to be the Forfarshire. Although a brave man and accustomed to scenes of danger, he hesitated to make any effort to save the passengers, such was the peril of the undertaking. Grace, however, aroused by sympathy for the survivors whom she could discern through the glass, urged her father to attempt a rescue and persuaded him to allow her to aid him. They made two trips and brought nine persons, all who had not previously perished, to the lighthouse in safety. The story of the young girl's courage led English people to collect for her a purse of money amounting to about $3,500.

Darlington, William (1782-1863), an American botanist. A native of Chester County, Pennsylvania. A practicing physician, member of Congress, 1815, and a banker. An enthusiastic collector and organizer of natural history societies. He wrote a *Flora of Chester County, Memorials of John Bartram and Humphrey*

Marshall, and an *Agricultural Botany.* Dr. Darlington corresponded with eminent botanists of Europe; among others, De Candolle, to whom he sent many specimens at the Paris Garden of Plants. De Candolle honored the enthusiastic doctor by naming the pitcher plant of California, "Darlingtonia."

Darmstadt, a German city, the capital of the Republic of Hesse, is situated on the Darm, 15 miles south of Frankfort. The city consists of a new and an old town. The latter is the business section and has narrow streets and old houses. The new town is modern with wide, well-paved streets, and fine houses and squares. Among the remarkable buildings of Darmstadt are the old palace, which contains a library of nearly 600,000 volumes and 4,000 manuscripts; it also contains a picture gallery and a fine museum of natural history. Other structures are the Roman Catholic Church, and the Town Hall, which was built in 1580. There is also a modern technical high school, with 2,678 students. Darmstadt's industries are chiefly iron founding and brewing. Population, 82,-367.

Darnley. See MARY QUEEN OF SCOTS.

Darter. See ANHINGA.

Darters, a group of small fishes, one to eight inches long, related to the perch. The smallest American species and one of the smallest of fishes, one to one and one-half inches in length, lives in the gravel bottoms of running streams from Minnesota to Indiana, and in other parts of the United States. They are strong swimmers. Dr. S. A. Forbes, writing of them, says: * * * "Forced from the fertile river beds and lake bottoms, they have taken refuge from their enemies in the rocky highlands, and have wrung from nature a meager living. Nothwithstanding their small size, they have developed an activity and hardihood, a vigor of life and a glow of high color almost unknown among the fishes of the lower lands," The males are brilliant in color, the females dull and speckled. See FISH.

Dartmoor, an elevated tableland and royal forest in Devonshire, England. The forest contains about 400 square miles. The moor lies about 2,000 feet above the sea, and is bleak, but affords pasturage and peat cuttings. Some of the peat beds are 20 feet deep. Many of the ravines are fertile, and afford fine trout fishing. Dartmoor is noted for a number of prehistoric ruins. A large number of American sailors and soldiers were confined in Dartmoor prison during the Revolutionary War. A number were shot in an attempt to get away after rumors of peace had been heard. This unfortunate event has been stigmatized as the "Dartmoor Massacre." The inclosure embraces about thirty acres. It is surrounded by two high stone walls, and is now in use as a convict prison. See ENGLAND.

Dartmouth (därt'muth) **College,** one of the earliest seats of learning in New England. It grew out of a school at Lebanon, Connecticut, for Indian boys. With $50,000 raised in England and a grant of 44,000 acres of land, the school was moved to Hanover, New Hampshire. In 1770 Eleazer Wheelock became the first president. The college was named for Lord Dartmouth, one of the liberal donors of money. The college has always been governed by a board of twelve trustees, acting under a charter granted by George III. In 1816 the state undertook to change the institution from a college to a university and to assume a partial conrol over the institution. The trustees brought suit. Daniel Webster, a graduate of the college, carried the famous case from court to court, obtaining finally a decision from no less a jurist than Chief Justice Marshall, sustaining the inviolability of the royal charter, and leaving Dartmouth in the hands of the old trustees.

The college occupies a beautiful site near the bank of the Connecticut. Buildings, new and old, and fine avenues of elms give an air of refinement to the grounds. The college is open to men only. In addition to the regular courses leading to the degree of A. B. and B. S., there are post-graduate courses in business administration and in civil engineering and a two-year preliminary medical course. A large and well-equipped chemical laboratory was added in 1921. Other recent additions

have added greatly to the value of the property, which is now approximately $6,000,000. In 1922, Dartmouth had 170 instructors and 2,000 students. The college library contains upward of 180,000 volumes.

Darwin, Charles Robert (1809-1882), an English scientist. He was a native of Shrewsbury. He was born on the same day as Abraham Lincoln. His father was an eminent physician. His grandfather, Erasmus Darwin, was the author of a number of botanical works of an inquiring nature. Darwin was educated at the universities of Edinburgh and Cambridge. At the age of twenty-two he received an appointment as naturalist on board the surveying ship Beagle, then about to be sent out by the British government on a voyage of exploration. This appointment was just what Darwin wanted. It determined his life work. The Beagle spent five years in circumnavigating the globe. Darwin returned with an immense store of specimens. Among his writings which resulted from the trip are his *Journal of Researches, Zoölogy of the Voyage, Structure of Coral Reefs, Volcanic Islands,* and *Geological Observations.* These give him a reputable standing as a man of science.

Among questions agitating men of science at that time was that of species. Are we, for instance, to consider the Shetland pony and the Norman draught horse as descendants of a common wild ancestor, or do they represent two distinct acts of creation?

Various appointments and sources of revenue permitted Darwin to retire to a quiet country residence where he carried on a series of experiments with pigeons, extending through a number of years. He chose the pigeon because it is possible to breed a great many successive generations in a short time. A pair of pigeons will have great grandchildren before the season is over. Now the pouter pigeon is famous for an ability to puff out the neck until it looks larger than the body. By selecting a pair of pouters, that lacked somewhat in the power of swelling the neck, and choosing from their young a pair that had still less of this power, and from the grandchildren a pair with still less again, he was able to breed pigeons that were not pouters. In the same way other strains, as fantails, were bred back and back toward a type with ordinary tails. By a long series of experiments he was able to announce that the numerous types and colors found in the fancier's dovecotes could all be bred back to a type resembling the rock pigeon that nests in the cliffs of the Mediterranean; from which he argued that our tame pigeons, of whatever color or variety, are derived from a single ancestral type, the rock pigeon. The result of his observations he made public in a famous volume called *The Origin of Species.*

Two phrases, "natural selection," and "the survival of the fittest," are heard frequently in connection with Darwin's theories. The strongest, and presumably the handsomest members of a species, naturally choose each other and improve the race, while the weaker, less favored members, especially if food be scarce or conditions unfavorable, are forced to the wall. In this way, by a process of natural selection a species may change in a marked degree.

The other phrase may be understood better perhaps by an illustration, drawn from the common muskrat that lives in shallow waters and burrows in banks. In case the homes of these animals were to dry up gradually, the theory is that those members of the species least able to do with less water would perish, while the others lived. This process, being kept up from generation to generation as the sloughs dried up more and more, would finally develop a species of dry-land muskrats. Out of each generation, the survival of the fittest members for a land life would develop a species of muskrats as able to live without bodies of water as are the house rats.

To illustrate further, in a hawk-infested district, the swiftest, shiftiest sparrows of each generation escape the hawks. The survival of the fittest members of each generation would develop in time a species of swift, alert sparrows, practically safe from old-fashioned hawks. In the meantime, the starvation of hawks unable to catch sparrows, and the survival of the fittest hawks of each generation would, in time, develop

a new species of extraordinarily quick sparrowhawks. Thus we should have a new species of sparrows and a corresponding new species of hawks. Many other examples might be given, but these are sufficient.

Other factors enter, of course, into Darwin's theory, but natural selection and the survival of the fittest account, in his judgment, with changes of climate, soil, and moisture, for numerous species and varieties of the violet, Indian corn, sheep—in short, of both plants and animals. An extension of the Darwinian theory, which is closely connected with evolution, has led to many startling conclusions; for instance, that the whale and the seal are descendants of former land animals, and that the remote ancestors of birds were reptiles, etc.

At first these doctrines met with opposition from those who considered them irreverent. Agassiz was one of those who stood stoutly for separate acts of creation Scientific men now, however, have very generally accepted Darwin's theories; holding it quite as reverent to trace varieties and species to the working of great laws as to assert that the Creator established fixed types which defy the influence of time and season.

In a late work, *The Descent of Man*, published 1871, Darwin maintained that man is descended from an early ancestor, having more or less of a monkey-like nature. For this theory he was bitterly assailed as ungodly. His favorite retort was that he would rather be regarded as the descendant of a monkey than of some people that might be named. Darwin was buried fittingly in Westminster Abbey.

The present generation think of him who bore this name as a rare combination of genius, industry, and unswerving veracity, who earned his place among the most famous men of his age by sheer native power, in the teeth of a gale of popular prejudice, and, notwithstanding provocations which might have excused any outbreak, kept himself clear of all envy, hatred, and malice, nor dealt otherwise than fairly and justly with the unfairness and injustice showered upon him; while to the end of his days he was ready to listen with patience and respect to the most insignificant of reasonable objectors.—Huxley.

See WALLACE; CROSS-FERTILIZATION; MUTATION.

Date. See CHRONOLOGY.

Date Palm, a fruit-bearing palm tree, ranging from the Canary Islands, through North Africa and Arabia, to India. The date palm is a lofty tree, thirty to one hundred feet in height. It bears clusters of 150 to 200 plum dates. A bunch weighs 20 to 25 pounds. A tree yields from 10 to 30 clusters a year. Dates are rich in sugar. The dried dates of commerce contain half their own weight of sugar. Dates are the principal production of the Arabs, and are their chief article of diet. Cakes of dried dates are their food on caravan trips. Deprive the Arab of the camel and the date, and vast sections of country would be depopulated. It is the chief plant of the oases of the Sahara. The crown of the tree is eaten as a palm cabbage; a fermented liquor is made from the fruit, and also from the sap. Baskets, bags, mats, wicker work, fans, walkingsticks, and ropes are made of the leaf-stalks, leaf-blades, and fiber. Portions of southern California and Arizona, dependent on irrigation and farthest removed from the cooling influence of the sea, have been found well adapted to date culture and have begun even to make shipments to the trade. See PALM.

Daudet, Alphonse, ȧl-fôns dō-dā (1840-1897), a French novelist. He was born at Nimes, and educated at the Lyons Lycée. He went to Paris and began to write verse when about seventeen years of age. His work met with some degree of success and he continued to write, contributing both prose and poetry to various periodicals. From 1862 to 1872 he produced a number of dramas which were only moderately successful. He produced during the remainder of his life many novels and humorous writings. Among those most popular in America are *Jack, Kings in Exile, Letters from My Mill, Tartarin of Tarascon,* a good humored satire directed toward the author's compatriots, and *Tartarin on the Alps.*

Daughters of the American Revolution, a patriotic society. The society was organized in the city of Washington, D. C., October 11, 1890. The headquarters are in Washington. Its present membership (1910) is reported by the secretary-general to be 60,250. One thousand

state chapters exist in forty-five states and territories and the District of Columbia, presided over by regents. Chapter regents have been appointed for England, Cuba, and the Philippines. Any woman may be eligible for membership who is of the age of eighteen years, and who is descended from an ancestor who, "with unfailing loyalty, rendered material aid to the cause of independence as a recognized patriot, as soldier or sailor, or as a civil officer in one of the several colonies or states, or of the United Colonies or States," provided that the applicant shall be acceptable to the society. Every application for membership must be indorsed by at least one member of the national society, and is then submitted to the registrars-general, who report on the question of eligibility to the board of management, and upon its approval the applicant is enrolled as a member.

Dauphin, dau′fĭn, a title given the eldest son of the French king. It was originally the title of the lord of the province of Dauphine. The last of these, dying without heir, bequeathed his territory to the French crown on condition that the king's first born son should be the Dauphin, or lord of Dauphine. The Dauphin's wife is known in history as the Dauphiness. In case the king had no son, the title was not given to his heir. The term is thought to be derived from the dolphin, worn as a symbol by the house of Dauphine. France being a republic, the title is now extinct. The Dauphin of France corresponds to the Prince of Wales in England, and to the Crown Prince of Germany.

Davenport, Eugene (1856-), an American educator and agriculturist, was born at Woodland, Mich., and educated at Michigan Agricultural College. He was assistant botanist in the Michigan Experiment Station from 1888 to 1889, later becoming superintendent of the farm and professor of practical agriculture. From 1891 to 1892 he was president of an agricultural college at São Paolo, Brazil. In 1895 he became dean of the Agricultural College in the University of Illinois and director of the experiment station, in 1896 becoming professor of thremmatology. Professor Davenport has done much important work in Illinois in relation to investigations of soil fertility. Among the books he has written are the following: *Principles of Breeding, Education for Efficiency* and *Domesticated Animals and Plants.* He has also written for the agricultural press and published several bulletins on agricultural topics. Since August 31, 1922, Professor Davenport has been *dean emeritus.*

Davenport, the most important commercial city of Iowa. It is the county seat of Scott County and is situated on the Mississippi River, 182 miles from Chicago and opposite Rock Island, Illinois. It is served by the Chicago, Rock Island & Pacific, the Chicago, Milwaukee and St. Paul, the Chicago, Burlington & Quincy and other railroads, while steamboat communication with all points between St. Paul and St. Louis add to its advantages. Davenport is in a rich agricultural region, and coal is found nearby. Among manufactured products are freight cars, locomotives, agricultural implement wheels, cigars, flour, washing machines, cereals, pumps, millwork, foundry products, pearl buttons, stereopticon and motion picture projectors, candy, ready-cut houses, bakery products, macaroni, overalls, optical goods, packing-house products, ladders, industrial gases, motor trucks, typesetting machines, lumber, farming tools, carriages and machinery. The city is built on the slope of a bluff which extends for three miles along the river. Two fine bridges connect it with the city of Rock Island. On the island, which is crossed by the wagon bridge, are situated the United States Arsenal and other government buildings. Other buildings are the modern Blackhawk Hotel, a Carnegie library, Chamber of Commerce building, four hospitals and some fine office buildings. The educational institutions include the Academy of the Immaculate Conception, Saint Ambrose College, and Palmer's Chiropractic Institute. There are several fine churches in the city, among them the Protestant Episcopal and the Roman Catholic cathedrals, St. John's Methodist church and the Kirkwood Presbyterian

church. The Iowa Soldiers' Home is located here.

Davenport was founded in 1833, and received its name from Col. George Davenport, one of the early settlers. It was incorporated as a town in 1838 and as a city in 1851. Population, 56,727.

David, a central figure in Hebrew history and literature. According to Ussher, he was born 1085 and died 1015 B. C. The lad's life with his father Jesse's flocks; the friendship of Jonathan; the jealousy of Saul; David's skill on the harp and skill with the sling; the death of the Philistine giant, Goliath; the winning of Abigail, his wife; the love of his sister Zeruiah, and the devotion of her three sons, Joab, Abishai, and Asahel; the extension of the kingdom of Israel over the surrounding heathen nations; his great crime toward Bathsheba and her husband Uriah; the faithfulness of the prophet Nathan; the rebellion of Absalom; the death of Abner; and David's preparations for the building of a great temple,—in all a reign of thirty-three years,—form one of the most interesting portions of the scriptural narrative. The Psalms of David, the sweet singer of Israel, rank with the finest examples of poetry in the Hebrew or any other language. In the King James Bible, that is to say, the common edition, the collection includes 150 psalms. It is the hymn book of the Hebrew people, called in their tongue the book of praises. In the original most of these psalms or sacred songs have titles. The title gives the name of the poem, the tune to which it is to be chanted, the occasion on which it is to be used, and the name of the author. According to these titles, one psalm was written by Moses, seventy-three by David, twenty-six by Solomon, and others by various writers. Thirty-four, assigned to no particular author, are called orphans by the Hebrews. Most critics think that David really wrote about forty of the selections. See BIBLE.

David Copperfield, a novel by Charles Dickens. It was published in monthly installments, the first chapters appearing in May, 1849. The story was completed and was published in book form the following year. *David Copperfield* is generally considered Dickens' masterpiece. It is without real plot. It is a simple story of the life of David from the day of his birth until, well on in years, his character is formed, and he is settled apparently in life. It contains considerable autobiography, more or less disguised. Digressions and many minor incidents, and even plots occur. This is in accordance with Dickens' usual method, and must not be regarded as indicative of inability on the author's part to invent and carry out a plot. *Barnaby Rudge* and many of his short stories prove him quite capable of this. The manner of publication must be held accountable for this fault, if fault it be. Nearly all of Dickens' novels were written in installments, not from the author's choice, but because public and publishers demanded it. Each installment must contain incidents of positive interest and still leave the writer ample freedom for the next installment, which was seldom written until after the publication of the previous one. Under such conditions, a plot, in the technical sense of the word, is impossible. To many readers, however, a story like *David Copperfield*, while less exciting, is more pleasing because more real than one constructed on more artistic lines. The average individual does not become entangled in complicated "plots." As he passes through his own varied experiences he is touched here and there by the lives and experiences of others, the incidents of whose careers become more or less involved with his own. This is the case with David Copperfield, which accounts in large measure for its popularity.

Dickens himself has said: "Like many fond parents I have in my heart of hearts a favorite child—and his name is David Copperfield." This has been explained on the ground that it is a story of his own life. It is evident to the sympathetic reader that, whether David is or is not Charles Dickens, Charles Dickens was certainly "David" while he wrote the story; that he lived, worked, and suffered in the scenes through which David passes; that to him Micawber was a real, if unavailing, friend; Ham Peggotty a hero, Steerforth an ad-

mired and disappointing companion, Little Emily a dearly loved sister, and Agnes a guiding spirit.

The style of *David Copperfield* presents, in a more marked degree than any other of his works, Dickens' peculiar characteristics. It is more easy and spontaneous; the pathos is more realistic; the humor, if less exuberant, is of a finer and more enduring quality. Nowhere does the general tone and character of expression so readily change to suit thought and feeling. The freedom given by the autobiographical form may account for this. There are many instances of most vivid description in the story. Mr. Peggotty's home in the boat, the Rookery, Betsy Trotwood's cottage, are clear pictures in the minds of thousands. It would be difficult to find in literature a nobler description of a storm than that in which Ham Peggotty gives up his life. Little Emily, with her false lover and her faithful uncle; Rosa Dartle, with her sad experiences and her awful inner life; Dr. Strong; his young wife Annie; their troubles with Jack Maldon and Uriah Heep, are stories within a story, complete and beautiful.

No one can ever believe this narrative, in the reading, more than I have believed it in the writing.—Dickens' *Preface to David Copperfield.*

Agnes Wickfield in *David Copperfield* is the most charming female character in the whole range of fiction.—Chambers.

In *David Copperfield* it is not difficult to trace the maturing power of experience, which points to the highest aims, and rejects those adventitious sources of attraction which are so tempting in the early career of genius.—Knight.

David, Jacques Louis (1748 - 1825), founder of the modern French school of painting, was born in Paris. In 1774 he went to Rome to study and paint. Two of his masterpieces, *The Oath of the Horatii* and *The Death of Socrates,* were painted during this period. He finished *Paris and Helen* and *Brutus* in 1788 and 1789. During the French revolution he was a Jacobin and an adherent of Robespierre, and the scenes of the Revolution gave him subjects for his brush. David, himself, considered *The Rape of the Sabines* his masterpiece. In 1804 Napoleon distinguished him by making him his first painter. After the second restoration of Louis XVIII he was banished, and retired to Brussels, where he died.

Davies, Sir Louis Henry (1845-), a Canadian jurist, Chief Justice of the Supreme Court of Canada since 1918, and Imperial Privy Councillor since 1919. He was born at Charlottetown, Prince Edward Island, and was graduated from Prince of Wales College in 1867. Mr. Davies became solicitor-general of Prince Edward Island in 1869 and in 1871-72, and premier and attorney-general during 1876-79. Entering the Dominion House of Commons in 1882, Mr. Davies served until his appointment as a judge of the Supreme Court. He was counsel for Great Britain before the International Fisheries Arbitration at Halifax in 1877; delegate to Washington in 1897 on the Bering Sea sealing grounds question; and in 1898, one of the Joint High Commissioners on the part of Great Britain for the settlement of differences between Canada and the United States. From 1896 to 1901 Mr. Davies was Minister of Marine and Fisheries of Canada. In the many ministerial capacities mentioned, Mr. Davies served ably, and gained a knowledge of affairs that is invaluable to his present position.

Davis, David (1815-1886), an American statesman, Supreme Court Justice, and executor of the estate of his personal friend, Abraham Lincoln. He was born in Cecil Co., Md., graduated from Kenyon College, Ohio, in 1832, and was admitted to the Illinois bar. After serving a term in the Illinois legislature, Mr. Davis was a judge of the State Circuit Court from 1848 to 1862. In 1862 President Lincoln appointed him to the United States Supreme Court, where he served until 1877. In 1872 he was nominated for the Presidency by the National Labor Reform Party. Mr. Davis resigned from the Supreme Court in 1877, and was a United States Senator from that year to 1883. When Vice-President Arthur succeeded to the Presidency after the death of President Garfield, Mr. Davis became the presiding officer of the Senate.

Davis, Jefferson (1808-1889), president of the Confederate States. He was

a native of Kentucky, but was reared in Mississippi. He was graduated from West Point in 1828, and served in the Black Hawk War of 1831-2. In 1835 he resigned and undertook the management of a cotton plantation in Mississippi. In 1845 he took his seat in Congress, but resigned to lead a regiment of Mississippi volunteers in the Mexican War. In 1850 he was elected to the United States Senate. During President Pierce's administration he was secretary of war, and again took his seat in the Senate in 1857. He was a constant advocate of the doctrine of state rights. When his state seceded he made a farewell speech in the Senate, February 9, 1861. The provisional congress of the Confederacy chose him president, a position which he held continuously until the collapse of the Confederacy. At the beginning of the war he made an appeal to the North to allow the South to secede peaceably, claiming that the Southern States had a perfect right to do so under the Constitution. Whether due to circumstances, or whether the duties of the presidency required him to do disagreeable things, the fact remains that Davis was not respected, either in the North or in the South, as were Lee and Stonewall Jackson. The South considered him arbitrary and tyrannical; the North held him responsible for the sufferings of soldiers in the Southern prisons. At the close of the war he was arrested and conveyed to Fortress Monroe. The grand jury of the District of Columbia indicted him for treason. He lay in prison for about two years without being brought to trial. He was then released on bail, Horace Greeley being one of the bailsmen. After his release by the general amnesty act of 1868 he went into business at the head of an insurance company, retiring finally to his estate in Mississippi. His remains were interred at Holly Wood Cemetery, Richmond, Virginia. His views of the Civil War are worded in *The Rise and Fall of the Confederate Government,* published in 1881. See SECESSION.

Davis, Mrs. Rebecca Blaine Harding (1831-1910), an American story writer. She was born in Washington, Pennsylvania. She was the first American writer to make use of the labor question in fiction. Her novels include *Life in the Iron Mills —A Story of Today,* published later as *Margaret Howth, A Law unto Herself, Waiting for the Verdict,* and others. Mrs. Davis has written many short stories which have been more widely read than her novels. Her style is simple and direct, and the tone of her stories invariably wholesome.

Davis, Richard Harding (1864-1916), an American novelist, war correspondent, and writer. He was a son of Rebecca Harding Davis, and was born in Philadelphia. He received his education at Lehigh University, and began his journalistic life in Philadelphia. *Gallegher,* his first literary success, is a story from his own newspaper experiences. It appeared with other stories in 1891. Since that time Davis has produced many novels and short stories which have won popular favor. *Soldiers of Fortune, Van Bibber and Others, The King's Jackal, The Bar Sinister,* and *The Princess Aline* are among those best known. Davis acted as war correspondent during the Spanish-American War, in South Africa, and in Europe.

Davy, Humphry (1778-1829), an eminent English chemist. He was born at Penzance, Cornwall. As a lad he was a fine hand at telling stories and setting off fireworks. At first a surgeon's assistant he became interested in chemistry, and held various positions as a lecturer. He became president of the Royal Society in 1820. Davy traveled extensively, and died, on the way home, at Geneva in 1829. Davy discovered several new elements, including potassium, barium, calcium, strontium, and magnesium. His early talent for storytelling developed into famous ability as a lecturer. It became quite the rage in London to attend Davy's lectures. Davy's great service to workingmen remains to be noticed. The greatest danger to which coal miners in their underground life are exposed is that of the explosion of fire damp, an inflammable gas that collects in the mines. It is almost as dangerous as gunpowder, and being frequently set off by the miners' lamps, caused great loss

of life. Davy collected fire damp from the coal mines of Newcastle and began experimenting. He first found out that it is made of carbon and hydrogen; then he found that it must be mixed with a large quantity of air before it will explode; next that it will not explode unless very hot; and, lastly, that but little heat is produced by an explosion. Davy reasoned that, if the flame of a miner's lamp could be prevented from heating the fire damp, there would be no likelihood of an explosion. He surrounded the flame of a lamp by a cylinder of fine wire gauze. The portion of fire damp entering through the gauze exploded in tiny puffs without creating heat; the gauze prevented the lamp flame from reaching and heating the fire damp outside, and the problem was solved. The inventor was made Sir Humphry Davy in recognition of his service. See DAMP.

Dawson City, a town 360 miles northwest of Skagway, situated on the Klondike River, near its junction with the Yukon. The town is reached by steamers from White Horse, 460 miles distant, from June 1 to October 15, and by coach and sledge during the remaining months. There are banks, hotels, electric light and telephones. It was named for George M. Dawson.

Dawson, Sir John William (1820-1899), a celebrated Canadian geologist and educator. He was born in Nova Scotia, educated at Edinburgh University, and at the age of thirty became Superintendent of Education in the province where he was born. Five years later he became principal as well as professor of natural history, at McGill College at Montreal, with which institution he was connected for nearly forty years. He established the McGill Normal School in 1857 and was its first principal; and a school of engineering the following year. As a factor in Canadian educational development, he stands among the first. He early took an interest in geology and he ranks among the great men in that field. Most of his publications were along that line. Aside from many treatises on the geology and natural history of Canada may be mentioned *Agriculture for Schools, The Story of the Earth and Man, The Origin of the World,* and *Modern Ideas of Evolution.* He was a member of the Royal Society (London), was knighted in 1883, and was president of the British Association in 1886.

Day, an astronomical term of varied meaning. Ordinarily it is the period of light, as distinguished from the darkness or night. It also means a period of twenty-four hours. In the latter sense the day of the Babylonians, from whom we have many astronomical ideas, began at sunrise. Among the Jews and Greeks the day began at the going down of the sun. This was formerly the observance in New England. All labor and play ceased at sunset Saturday. As soon as the sun went down Sunday the children of the village burst forth with many shouts to play. Among the Egyptians and Romans the day began at midnight. Our day, derived from legal sources, that is to say, from Roman law, has finally prevailed over the Hebrew day as derived from the Bible. The question of convenience has been a determining factor. It would be gain in many respects if the twenty-four hours of the day were numbered from one to twenty-four consecutively, making 2 P. M. 14 o'clock, etc.

The day, as distinguished from the night, is of uniform length only on the equator. The summer day lengthens as we go from the equator toward either pole. The longest day for each locality equals the longest night for the same locality, but it comes six months later.

Dayton, an important city of Montgomery County, Ohio, is located on the Miami River, about 60 miles northeast of Cincinnati. It is an important railroad center and manufacturing point. The city is beautifully laid out with broad streets and fine buildings.

The public school system is of high order and in addition there are located in the city the United Brethren Theological Seminary, St. Mary's Institute and the Academy of Notre Dame. Here also are located a soldiers' home, hospitals, a state insane asylum, and other institutions.

The city has large water power and among its manufactured products are cash registers, railway cars, oil-mill machinery,

steam pumps, sewing machines, automobiles, engines, flour, sash and doors, and other articles. In April, 1913, a disastrous overflow of the river caused great loss of life and property. The population in 1920 was 151,559.

Deaconess, one of an order of women in the early Christian church. Deaconesses assisted in the baptism of women, instructed girls in their catechism, took care of the sick, helped the poor, and were present at interviews of the clergy with women. They were usually widows and were required to remain unmarried. At first a woman could not belong to the order until she was sixty years old; but later forty-five years was made the minimum age. The order became extinct in the twelfth century. In the nineteenth century the order of deaconesses was revived in several Protestant churches, notably the Protestant Episcopal, the Methodist Episcopal and the Lutheran churches. Usually two years' training is required before a woman is received into the order. The deaconesses of any one parish reside together in a home established for that purpose. Their work is largely among women and children. They nurse the sick, feed the hungry, clothe the poor, rescue the sinful, and comfort the sorrowful. They are also trained to assist in religious services and to give religious instruction.

Dead Letter Office. See POST OFFICE.

Dead Sea, a celebrated lake of Palestine. It occupies a sunken valley at the eastern foot of the Lebanon Mountains. It is the deepest known inland depression in the earth's surface. The lake is forty-six miles in length and from five to nine miles wide. Its surface is 1,292 feet below the surface of the Mediterranean. The depth of the water varies from three feet to thirteen hundred feet at the center of the northern section. The River Jordan is the chief tributary. There is no outlet. The waters are charmingly blue, but bitter to the taste, and fetid. It is several times as salt as the ocean. People who go in bathing cannot sink. They require to use care, or else the body assumes an inconvenient position—feet up and head down. The only life in the water consists of a certain low animalcule. The east and the west shores are steep limestone cliffs. The northern shore is a brackish, muddy flat, with here and there a dead tree incrusted with salt. The southern shore is equally dreary and desolate. It is marked by a long ridge of rock salt, 300 feet high, called by the Arabs the ridge of Sodom. There are no present indications that the valley ever was inhabited; there is little life of any sort in the vicinity, though a few bird-inhabited thickets of oleander are found on the shore and in the valleys of tributaries. Twenty-five per cent of the water consists of solid matter; seven per cent is salt. Divers bring up salt from the bottom of the sea, dry it in the sun, and carry it on camels to market at Jerusalem. This lake has been called also the Sea of Sodom and the Salt Sea. See CASPIAN; DEATH VALLEY.

Deaf-Mutes, persons both deaf and dumb. Inability to talk follows from the inability to hear. Deafness is due to some defect in the ear, of course. It may be traced often to scrofula and other diseases. The children of a marriage between first cousins are particularly liable to be deaf. A deaf person is wonderfully imitative. The necessity of communicating by signs when words fail has led to the gradual evolution of a sign language, now regularly taught in deaf-mute schools, or schools for defectives, as they are called.

The ancients and the medieval writers considered it hardly possible to educate a mute. Accounts of individual instruction appear with increasing frequency, however; and in 1778, during the progress of the American Revolution, the first public school for deaf-mutes was established at Leipsic. Public institutions for gratuitous instruction were soon established in other European countries. The first in America was founded in 1817 at Hartford. They are now the rule in the various states and provinces.

In addition to the sign language, which has been compared to that of the plains Indian, sign alphabets have been devised. Spelling by hand is rather slow, but it is accurate. There is no special difficulty, of course, in teaching deaf-mutes to read and to write with facility.

EDUCATION OF THE DEAF. No systematic attempt to educate deaf-mutes seems to have been made before the middle of the 17th century. A school for poor deaf-mutes was established in Leipzig in 1778. The first school in the United States was opened in Hartford, Conn., in 1817. Massachusetts and New York established similar schools and now every state has a school for the education of the deaf or provides for their education in institutions of adjoining states. In 1923 thirteen states of the Union provided instruction for deaf-mutes in the public schools. Including state institutions, private schools and public schools, there were over 150 schools in the country where deaf-mutes could receive instruction. In the number of schools and their equipment the United States leads the world in educating the deaf.

In Canada schools for the deaf are maintained at Montreal, Quebec, Toronto, Winnipeg and Victoria.

For purposes of education the deaf are divided into three classes—those deaf from birth or from early infancy, those partially deaf from birth or infancy and those who have by accident become deaf after speech has been acquired. By proper education all these classes can be led to become self-supporting and self-respecting citizens. All deaf people use the sign language to some extent, but the most progressive schools teach their pupils to speak and to understand when spoken to. They are trained to speak by observing the lips and other vocal organs of the teacher and then imitating them. When certain sounds are uttered the pupil touches the teacher's throat, then places his hand upon his own throat and tries to reproduce the same vibrations. His sensitive fingers tell him when he has mastered the sound.

The pupil learns to understand others by lip reading and many become so skillful that they can understand a public speaker if they sit near him. The speech of mutes is not perfect nor natural, because it lacks inflection, and because the articulation of some words may not be distinct; but nearly all mutes taught by this method can make themselves understood and carry on a conversation.

Since it is more difficult to teach the articulate method, if the sign method has been used, this method has been discarded by the most progressive schools. All schools for the deaf teach their pupils to read and write, and give them the same instruction in the common branches as normal pupils receive. They are also taught a number of trades.

There are two manual alphabets used by deaf-mutes, one requiring the use of one hand only and the other requiring the use of both hands. Many mutes are very proficient in the use of these alphabets, but this means of communication is restricted to those who know the alphabets. By persistent use of their limited power of hearing, those who are partially deaf often improve their hearing, and teachers of this class of pupils pay special attention to securing such a result.

In 1923 thirteen states had provided day classes for deaf-mutes in the public schools, and there were over 150 institutions including state schools, private schools and public schools devoted to the education of the deaf. In the number of schools and their equipment the United States leads the world in their line of instruction.

Dearborn, Henry (1751-1829), an American soldier, was born at Hampton, N. H. He was practicing medicine at Portsmouth, N. H., when, hearing of the Battle of Lexington, he set out at once with a company of volunteers, and the next day arrived at Cambridge, 65 miles away. Dearborn was made a captain and served at Bunker Hill. With Arnold he went through the Maine woods to Quebec; and he was a major under Gates at the capture of Burgoyne. He distinguished himself and his regiment by a daring charge at the Battle of Monmouth in 1778. Dearborn served with Sullivan against the Indians in 1779, and was in the final campaign at Yorktown. He was twice a member of Congress, and was Secretary of War in Jefferson's Cabinet. He became senior officer of the United States Army in 1812, but resigned in 1815. In 1822 he was made minister to Portugal, but was recalled at his own request two years later. His last years were spent in Roxbury, Mass.

Death's-Head Moth, a species of hawk moth, widely distributed in Europe. With extended wings, it measures from tip to tip almost 5 inches. The body is yellow with black markings. The caterpillar is greenish yellow, the back speckled with black. It feeds on the potato, tomato and other plants. It is seen in the autumn, mornings and evenings only.

Death Valley, an alkaline valley in a desert region in California, on the Arizona border. It occupies a depression 276 feet below the level of the sea. It is the lowest depression in the United States. Mount Whitney, 14,500 feet high, one of the highest elevations in the United States, is only seventy-five miles away. The valley is seventy miles long and is ten to twenty miles in width from foothills to foothills. Of a party of thirty explorers who entered the valley in 1849, looking for gold, all but twelve perished; whence the name. In summer it is said to be one of the driest, hottest places on the face of the globe. The thermometer reaches 130 in the shade. The nights are too hot for sleep. The valley is surrounded by volcanic mountains that shut out moisture. Terrific whirlwinds cross the plain. They are gyratory columns of sand dust—sand augers, they are called —thousands of feet in height, reaching to the clouds, we might say, only there are no clouds in the pitiless sky. Tourists may enter the valley late in autumn, but must carry water for man and beast. The one bitter alkaline stream that enters the valley is soon swallowed up in the sand. Springs are far apart. Visitors to the region find a sandy, gray waste, barren save for the stunted cacti and dwarf greasewood. A few crows, starved jackrabbits, slinking coyotes, rattlesnakes, buzzards, and horned toads manage to pick up a living. The surrounding mountain ranges are rich in minerals, but the mines are difficult to work for want of water.

The Death Valley is the lowest of a series of old lake beds found in the vicinity. A salt marsh or sump follows the center of the valley almost from end to end. This sump is seemingly bottomless. The longest poles are swallowed up. A stone is said to have carried a line down two hundred feet without stopping. The sump is about half as wide as the valley. Near the middle it contracts to two miles in width and is shallow. Here a wagon road was constructed for the long mule trains once engaged in hauling borax from the valley. There are a few footpaths also, but many men and beasts have lost their lives in trying to cross the swamp.

See BORAX.

Debate, a consideration of a two-sided question. In one sense of the word a person may debate alone. Hamlet's famous soliloquy, "To be or not to be," was a debate with himself. When Caesar rode up and down on the bank of the Rubicon he was arguing both sides of a question with himself. He ended the debate by issuing orders to cross the boundary and march on Rome.

In parliamentary usage a debate is a series of speeches, long or short, some favoring, others opposing, a proposed measure. If all speakers hold the same view such a consideration of a question can hardly be called a debate. A prearranged debate between two speakers, as two rival candidates for office, is called a joint debate. In 1858 Abraham Lincoln, who had been chosen by the Republicans to contest the United States senatorship, challenged Stephen A. Douglas, the incumbent, and the most effective stump orator in the country, to a series of joint debates. The fame of the speakers and the burning question of free soil drew tremendous audiences. Douglas won reëlection at the hands of the Illinois legislature, but Lincoln drove his opponent into a logical pocket, and won a reputation that brought him the nomination for the presidency. To succeed in joint debate a speaker must carry his end of the argument well, and not only that, he must be prompt to refute the arguments of his adversary and quick to take advantage of an opponent's errors. Daniel Webster made a strong point of restating an opponent's argument, fairly strengthening it, and then crushing it with a powerful sentence or two.

The greatest arena for debate in the world is the British House of Commons. The measures that come before that body

may concern a single parish or even a single parishioner in Wales, or they may be measures affecting the welfare of half the civilized world. The great debates are likely to come off after dinner, that is to say, about eight or nine o'clock at night. A long table occupies the center of the hall. Along one side sit the members of the ministry with their books and documents before them. Directly across the table, and facing them, sit the leaders of the opposition. The members of the government party and of the opposition sit behind their leaders on long benches, one tier rising behind another, but all facing the center. The speakers rise in order, the younger men first, a speaker on one side, then a speaker on the other. The debate is closed by the acknowledged leader of each party, usually an ex-minister for the opposition and the prime minister for the government. Then the vote or decision is taken.

A school debate is an excellent method of arousing interest in geographical, historical, and social questions. In an elementary debate, designed to enliven school work, it is not necessary to be formal. A pupil may be appointed to preside. A leader should be appointed for each side of the question. A day or a week may be allowed for preparation. It is customary for the leader on the affirmative to speak first. Then comes the leader on the negative side. Other speakers follow, as arranged by the leaders. At the close of the debate the leaders sum up for their respective sides. The affirmative side is the more difficult. It is considered proper courtesy, therefore, to reverse the order in closing, and to allow the leader on the affirmative side to speak last. In their closing speeches the leaders are expected to introduce no new arguments, but to confine themselves to refutation and summary. A decision by judges adds interest to a debate. No formal rules can be laid down for a decision; but a judge is justified in considering both argument and skill of presentation. The burden of proof is held to lie on the affirmative side. If the arguments of the affirmative be refuted, the negative wins, even without presenting arguments on the negative side. It is well for the instructor to follow with a review of the debate and suggestions for improvement.

The following topics were suggested in a recent Winona Normal School bulletin as suitable for an advanced class in geography:

1. *Resolved,* That Minnesota is a more desirable state to live in than California.

2. *Resolved,* That the acquisition of the Philippine Islands will ultimately prove of more value to the United States than the purchase of Alaska.

3. *Resolved,* That national expositions do not benefit the countries in which they are held.

4. *Resolved,* That the earth is spheroidal in shape and that we live on the outside of it.

5. *Resolved,* That Arctic explorations should be continued.

6. *Resolved,* That the United States Weather Bureau is of sufficient value to justify its continuance.

7. *Resolved,* That Canada should be annexed to the United States.

8. *Resolved,* That in the future the Amazon will be of more commercial importance than the Mississippi.

9. *Resolved,* That on account of location Duluth is bound to become as great a city as Chicago.

10. *Resolved,* That the natural resources of Wisconsin are as great as those of Minnesota.

11. *Resolved,* That there are as many places of interest in Chicago as there are in New York City.

12. *Resolved,* That it is better to see and know your own country before traveling abroad.

13. *Resolved,* That navigation on the upper Mississippi is of sufficient importance to justify the national government in opening and maintaining a six-foot channel to St. Paul and Minneapolis.

14. *Resolved,* That the Panama canal will be of sufficient value to justify the government in building it.

15. *Resolved,* That the victory of Japan over Russia advanced the interests of civilization.

16. *Resolved,* That the United States government should spend less money in improving rivers, and more in irrigating the arid lands of this country.

Debs, Eugene Victor (1855-), an American socialist and labor leader. He was born at Terre Haute, Indiana. His education was received in the common schools, and at an early age he became a locomotive fireman. He was sent to the Indiana legislature in 1885, later held an office in the Brotherhood of Loco-

motive Firemen and was president of the American Railway Union from 1893 to 1897. He conducted the railway strike of 1894, and while this was in progress was charged with conspiracy. He was acquitted but was imprisoned for six months for contempt of court. In 1920 he was sentenced to imprisonment for ten years for inciting to disloyalty. He was pardoned by President Harding December 25, 1921. While in prison he was again nominated for President by the Socialists.

Debts, National, amounts owed by governments. A national debt is in the form usually of bonds bearing a fixed rate of interest. Sometimes the bonds are sold for face, sometimes at a premium, and sometimes at a ruinous discount—all according to the credit of the borrowing government and the amount of money waiting for investment. War is the great cause of public debt. The Spanish-American War, the Boer War, and the Russo-Japanese War increased the debts of the countries concerned. Government bonds are attractive for several reasons. They are considered safe. They are exempt usually from taxation; they are converted readily into cash, and may be had in large or small blocks.

Before 1914, according to the *Statesman's Year Book* nearly, if not all civilized countries, even frugal Switzerland, had a bonded indebtedness. France had the largest national debt. It was increased greatly by the expense of the Franco-Prussian War and the indemnity demanded by the Germans. The public debt of Great Britain was considered one of the most remarkable in the world. It had been formed largely by the expense of acquiring and administering so many colonial possessions. No attempt was being made to reduce the principal even before the war.

The debt of the United States began with borrowing money to pay off the expenses, and the debts of the Revolutionary War. Under Washington's first administration, and thereafter, for a time, the public debt was about $75,000,000. The purchase of Louisiana increased the debt to $86,000,000. This amount was diminished year by year, but ran up again on account of the War of 1812 to about $125,000,000; but by 1835 this debt had been reduced to a nominal $37,000, with $40,000,000 on deposit in various banks to the credit of the United States. The Mexican War created a new debt of $70,000,000, which had not been materially reduced before the enormous expense of the Civil War created a national debt unprecedented for rapidity of growth. In February, 1861, Congress authorized the secretary of the treasury to borrow $25,000,000; a year later a similar act authorized the borrowing of $250,000,000; and this was but one of many similar acts. The United States debt reached its climax in 1866, when the statement of the United States treasurer showed a public debt of $2,773,236,174. By 1893 this debt had been reduced a half. The Spanish-American War, the erection of public buildings in many cities, the enlarging of the pension list, the extension of rural free delivery and the building of the Panama canal, brought the debt to a point of over two billion again. Of this amount $925,011,637 was a bonded indebtedness bearing interest. At the close of the Civil War our national debt amounted to $79.44 per person. In 1913 the net total of the National indebtedness above cash on hand, amounted to only $11.10 per capita.

In April, 1918, the Federal Reserve Board of the United States issued a comparative statement of the war debts of the twelve principal warring nations. It showed that after three and a half years of war the debts of the chief allied and central powers had increased from nearly $26,000,000,000 to more than $137,000,000,000. Most of the more than $111,000,000,000 increase represents war expenditures up to the early part of 1918. Following is an authentic table showing the pre-war national debts, and the debts down to the signing of the Armistice, of the seven most important nations included in the Reserve Board list:

	Before War	Nov. 11, 1918
Great Britain	$3,500,000,000	$34,000,000,000
France	6,800,000,000	27,000,000,000
Italy	2,900,000,000	11,000,000,000
United States	1,300,000,000	24,000,000,000
Russia	5,000,000,000	27,000,000,000
Germany	1,200,000,000	39,000,000,000
Austria-Hungary	3,700,000,000	24,000,000,000

The following is the latest available table of the post-war debts of the leading nations of the world:

Country	Debt
Argentina	$ 642,622,150
Australia	1,807,740,000
Austria	23,338,600,000
Belgium	5,047,388,000
Brazil	500,000,000
Chile	93,289,000
China	1,066,649,000
Czecho-Slovakia	2,000,000,000
Denmark	295,000,000
France	48,048,400,000
Germany	71,000,000,000
Great Britain	35,000,000,000
Greece	200,000,000
Hungary	10,890,000,000
Italy	742,500,000
Japan	1,555,000,000
Jugoslavia	712,000,000
Mexico	500,000,000
Netherlands	55,000,000
Norway	3,350,000,000
Poland	2,000,000,000
Portugal	185,000,000
Rumania	4,000,000,000
Roumania	4,000,000,000
Russia	16,150,000,000
Spain	2,000,000,000
Sweden	355,000,000
Turkey	855,000,000
United States	23,976,250,608

The United States was the only nation in 1923 that was reducing her debt annually.

Decalogue, dek′a-log, the ten commandments, found in the twentieth chapter of the book of Exodus, and in the fifth chapter of Deuteronomy. These commandments were given to Moses during the first of the forty years spent by the Israelites in the wilderness after they had been led out of Egypt. The nineteenth chapter of Exodus tells how Moses in accordance with the command of God called the people forth out of the camp "to meet with God," how they stood below Mount Sinai while Moses went up to the top of the mountain and received the commandments directly from God. In Deuteronomy Moses tells the people that God wrote these commands on two tables of stone and delivered them unto him. The Jews call the commandments the "ten words" which is the literal meaning of the Greek word decalogue. The precepts are somewhat differently divided in different churches. The Roman Catholics and Lutherans regard Exodus xx: 3-6 as one commandment and divide the seventeenth verse into two commandments, while all the protestant churches except the Lutheran consider the third verse as one commandment, the fourth, fifth and sixth as another, and do not divide the seventeenth verse but regard it as one commandment, the tenth.

Decameron, The. See Boccaccio.

De Candolle, deh kŏn-dol′, **Augustin Pyrame** (1778-1841), a noted French botanist. He was born at Geneva and educated first for the law, then for medicine. It is noticeable that the botanists of the eighteenth century approached their favorite science by way of medicine. De Candolle was wont to excuse himself for leaving medicine by saying, "If I make a mistake in naming a plant, I can set it right." Influential friends wondered that a man of his talents should spend his time running about France gathering plants. After holding various positions De Candolle settled down in a professorship at Geneva, where he accumulated a large herbarium and wrote several botanical treatises. He named many plants new to science. De Candolle was a close reader of Linnaeus' works, but adopted the classification of Ray and Jussieu. See Linnaeus.

Decatur, Stephen (1779-1820), an American naval officer. He was of French descent and was born at Sinnepuxent, Maryland. His father, also Stephen Decatur, had won distinction in the navy during the Revolution by capturing English vessels. In 1798 at the commencement of his hostilities with France he was placed in charge of the Delaware and with this vessel captured two French privateers. That same year the young Stephen, then nineteen years of age, entered the navy as midshipman. The next year he was made lieutenant. This was at the time, it will be remembered, of the Tripoli War, a result of the pillaging and confiscating by the Barbary pirates. Decatur served in this war, and was at various times in command of several different vessels. In 1804, while in charge of the Intrepid, he entered the harbor of Tripoli, captured and burned the Philadelphia, which had been taken prison-

er by the Tripolitans, and made his escape under the terrific fire of 141 guns. This deed was pronounced by Lord Nelson "the most daring act of the age." Decatur was at once promoted to the rank of captain, the highest regular rank in the United States navy. A few years later he was given the title of commodore by courtesy, as were all captains in the navy who had commanded a squadron. The regular office and title of "commodore" existed in the United States navy from 1862 to 1900 only. Decatur took part in several later attacks on Tripoli. In the War of 1812, in command of the frigate United States he captured the British frigate Macedonian, but two years later was obliged, after a gallant resistance, to surrender to four British ships. In 1815 Decatur was put in charge of a squadron sent to operate against Algiers and the Algerine pirates. He was successful in the undertaking, forcing the Dey of Algiers to declare the American Flag inviolate. He then brought Tunis and Tripoli to terms, obtaining satisfaction for their offenses in breaking the terms of their treaties. In 1816 Decatur was made naval commissioner. He was shot in a duel by Commodore James Barron.

Decatur, a manufacturing city of Illinois. It is situated on the Sangamon River, thirty-eight miles east of Springfield. It is important on account of its industrial interests, and as a distributing center for coal, live-stock, grain and other argicultural products. The city is served by the McKinley Electric system and by the Wabash, the Illinois Central, the Vandalia, and other steam railroads. There are foundries, railroad shops, bridge works, the largest corn mills in the United States, and manufactories of flour, farming tools, furniture, carriages, caskets, mantles, and engines. The city has an excellent public school system, about twenty-five church edifices, a hospital, three national banks, and a public library. The James Millikin University and a Roman Catholic convent and academy are located there. The population of Decatur in 1920 was 43,818.

Deccan, the peninsular portion of India lying between the Bay of Bengal on the east and the Arabian Sea on the west. The word is Hindu, meaning the south, *i. e.,* the southern part of Hindustan.

December, the twelfth month of the year. In the Roman year, which began with March, December was the tenth month; whence the name. December 22d is the winter solstice—the period of shortest day in the northern hemisphere and of longest day in the southern. December 25th is the great holiday of the Christian world. Among the Romans the month was supposed to be under the special care of Vesta, the goddess of the hearth. The idea is a pretty one, symbolical of a season when the warm fireside and a bright flame are particularly acceptable. See CHRISTMAS; CALENDAR.

Decemvirs, dē-sĕm′vers, in Roman history, ten men appointed to systematize or codify the laws of the city. About 302 B. C. they presented their report. It was engraved on tablets of bronze erected in the Roman forum that all might read. A year later two additional tablets were added. The laws thus published are known as the Twelve Tables. School boys learned them by heart. The significance of the work of the decemvirs lies in the fact that their appointment and the publicity of the code were demanded by the common people, that all might know what the laws were, and be secure from prosecution under little known or forgotten enactments. Written laws are a safeguard against tyranny. See CODE; SIBYLS.

Declaration of Independence, a famous act of the Continental Congress. June 10, 1776, a committee of five, consisting of Thomas Jefferson, John Adams, Benjamin Franklin, Roger Sherman, and Robert R. Livingston, was appointed to draw up the Declaration. The chairman framed the report. A few clauses in the charges against the king were canceled by the Congress, but the Declaration as it stands today is substantially the work of Thomas Jefferson. It was reported June 28th. It was adopted July 4th amid the ringing of bells and general jubilee. Copies were sent out broadcast over the signature of the president and secretary. July 19th Congress ordered the Declaration engrossed on parchment, that the historic document

might be signed by the members. August 2d it was signed by fifty-three members, then present. Absentees and others signed later. The last signature was affixed November 4th. In 1823 a copperplate facsimile was made under orders of President J. Q. Adams. In the process, the artist faded the original text and the signatures until portions are illegible. Up to this date the Declaration was shown freely and on special occasions thereafter, but in 1823 it was sealed up in a steel case secure from light and decay. It rests in the keeping of the secretary of state at Washington. It is said that, of all the fifty-six signers, not one died with a tarnished reputation. The last survivor, Charles Carroll of Carrollton, Maryland, passed away in 1832.

Decoration Day, or **Memorial Day,** a day set apart for the decoration of the graves of soldiers who fell in the Civil War, and for the holding of commemorative exercises. This observance originated in the Southern States. It was copied in the North. In 1868 General John A. Logan, then commander-in-chief of the Grand Army of the Republic, issued a general order setting aside the 30th of May for the purpose of strewing flowers on the graves of old soldiers and for such exercises as local posts may direct. In many of the states that date is made a legal holiday. Owing to the earlier appearance of flowers in the South, April 26th is set apart as Confederate Memorial Day by Alabama, Florida, Georgia, and Mississippi, and May 10th by North and South Carolina. It is now customary, both North and South, to decorate the graves of soldiers regardless of the side on which they fought. Credit for this beautiful courtesy belongs to the women of the South. See HOLIDAYS.

Deduction. See THINKING.

Deed, in law an instrument in the nature of a contract usually employed in the conveyance of real estate. The word is Anglo-Saxon, and means that which is done beyond recall. Deeds for real estate, because of the permanence of the transaction, require greater form and solemnity than other contracts and are usually drawn with great care, and made a matter of public record.

The following are the principal requisites for a deed throughout the United States. It must be on paper or parchment and completely written before delivery. It must be between competent parties, upon neither of whom shall there be any restraint. It must relate to suitable property and the consideration must be good and valuable. It must be signed, sealed, and delivered and the obligee must accept it before it becomes binding.

It were well to distinguish between the two common kinds of deeds, warranty and quit claim. The former is one in which the grantor warrants the title, and agrees to make it good if any flaw is found; while in the latter, only such title as the owner has is transferred.

A deed is said to be in escrow when it is delivered to a third person to be held until after some specified event before delivery to the grantee. For greater security deeds are usually recorded by a public officer called a recorder or register of deeds. Such public record serves as *prima facie* evidence of the ownership of property and a deed so recorded would hold over another given for the same property not so recorded.

Deer, a family of cloven-hoofed, cud-chewing animals, including the elk, moose, caribou, and reindeer. There are numerous species found in both hemispheres, but, generally speaking, the deer corresponds in the north temperate zone to the antelope of southern Africa. The male of the deer kind is known as a stag, or a buck; the female as a hind, or a doe; the young, which are usually spotted, are called fawns.

The stag is provided with antlers. The antlers are bony outgrowths from the forehead. The first appearance of the antler is a blood-red swelling, which elongates rapidly until it has taken the shape of an antler. It is at first covered with a soft skin, when it is said to be in the velvet; after the bony material has set the velvet dries and rubs off. A stag sheds his antlers and grows new ones every year. His age may be known, within certain limits, by the number of branches. The antler of a stag a year old has but one prong; that of a two-year-old, two prongs. A royal stag is one with twelve-tined antlers.

Virginia deer.

Muntjac of Java.

Fallow deer.

Stag with doe and fawn.

Roe (in background).

DEER.

The common red deer of Europe is celebrated in literature and in history, but has long since been exterminated, except where protected. Many fine herds are kept in the parks of England, as at Greenwich and elsewhere. Large deer preserves have been established in the Highlands of Scotland. Extensive tracts of rough country, of comparatively little value for agricultural purposes, in some instances comprising 50,000 to 70,000 acres, have been set aside for hunting purposes under the jealous care of gamekeepers. Many of these estates are let for an annual rental to those who can afford expensive sport. It is nothing for a wealthy member of Parliament or tradesman to pay from $5,000 to $20,000 annual rental for a Highland deer preserve with its hunting lodge and facilities for entertaining company. A million dollars or so are paid annually for the use of these preserves. Stags only may be taken. They cost these wealthy Nimrods about $250 apiece. There are several species in the wooded districts of South America and India.

There are three prominent game deer in the United States and Canada. The mule deer is the characteristic deer of the Rocky Mountain region. It is the largest and most stately of our deer. Large specimens attain a shoulder height of forty-two inches. The antlers attain a spread of twenty-nine inches. The coat is steel gray in winter, to match the gray rocks. The summer coat is of a grayish brown. The flag or tail, when lifted, shows white with a black tip. The mule deer lives in the Bad Lands and foothills and ravines of the Rocky Mountains, ascending plateaus 12,000 feet above the sea. It is capable of living on scanty vegetation. Even sagebrush does not come amiss. A small variety is found in Alaska. The mule deer is approaching extinction rapidly, as are so many of our larger mammals.

The Columbia black tail is a deer of the Pacific coast. Its flag is black, with a white fringe at the tip. It lives in the dense coniferous forests that extend from British Columbia to California. It feeds on evergreen foliage. Park specimens taken to the East die of stomach troubles.

The deer of North American literature is the white tail or red Virginia deer. At present it reaches its greatest size and perfection in the evergreen country reaching from Minnesota to the Adirondacks. A large specimen stands thirty-six inches high. A small variety is called the Florida white tail. A western, somewhat dwarfed species is known as the Arizona white tail. This deer has the faculty of skulking in the summer time, and of rearing its young in brush near human habitations, without being discovered. It is still to be found in every state and territory of the Union, it is said, save Delaware, Oregon, Nevada, California, and Arizona. Its general color is chestnut red, turning grayish in winter; with a tail, white beneath, which, as hunters say, is thrown up like a flag when the deer leaps.

In eastern North America the deer was a factor in aboriginal life not unlike that of the camel among the Arabs, or the buffalo among the Indians of the plains. Its meat, called venison, was a staple article of diet. When cut into strips and dried or jerked in the sun, it could be kept for a considerable length of time. The hide was used for moccasins and clothing. The sinews, finely divided, were used for thread; deer's hair served for stockings, and untanned pelts, or pelts tanned with the hair on, were used for tents and for blankets in which to sleep. The white settlers who drove the Indians from their hunting grounds were scarcely less indebted to the deer for food and clothing. The buckskin hunting shirt and leggings are as much a part of the traditional hunter and guide as his coonskin cap. Cooper's *Leatherstocking Tales* take their name from the deerskin leggings worn by Natty Bumpus. Col. Boone and his Kentucky rangers were clad in buckskin hunting shirts.

At present deer are protected by law in the states and provinces where they are still found; but actual settlers, and those who supply meat to lumber camps, regard the laws as designed for the particular benefit of city hunters, and pay very little attention to them. The deer is very adroit in hiding itself in thickets, and brings up its young surprisingly, under difficult cir-

cumstances; but settlements, dogs, and guns are exterminating it rapidly. Warner's *A-Hunting of the Deer* is a sympathetic piece of writing. William J. Long has written entertainingly of the deer in his *Secrets of the Woods.*

See ANTELOPE; GOAT.

Deer-Mouse, a handsome, delicate wild mouse. It is also called the white-footed mouse. It has rounded ears, wide, innocent eyes, fawn-colored sides, a daintily marked back, and white under parts. It is about seven inches long, half tail. It moves about at night and is active all winter. In the summer time, it collects nuts and seeds, stowing them away in hollow trees, and under stones and logs, or in pockets in the turf. A pair of small pouches, chipmunk-like, are used to carry supplies. The deer-mouse is fond of honey. When pursued the deer-mouse endeavors to escape by long jumps, not equal, of course, to those of the jumping mouse. While apt to be a nuisance in camp from a habit of pilfering food, the deer-mouse is a companionable little fellow, quite free from the vicious habits of the European house mouse. See MOUSE.

Deere, John. See PLOW.

Deerslayer, The. See COOPER; LEATHERSTOCKING.

De Foe, Daniel (1661-1731), the author of *Robinson Crusoe.* His father was a London butcher. Daniel's personal history is a series of ups and downs—chiefly downs. He studied for the Presbyterian ministry, but joined in Monmouth's rebellion and narrowly escaped having his head cut off. He set himself up in trade, selling hose, but failed in business. He held an appointment under the government collecting a tax on windows, but was thrown out by the repeal of the law. He then lost all he had in the tile business. He wrote a pamphlet against the High Church party. He was arrested, set in the pillory, had his ears cut off, and was imprisoned for two years. In all he wrote about 254 books and pamphlets. He died of apoplexy at the age of seventy, needy, in debt, immortal.

Robinson Crusoe, the most popular of boy's books, was written when De Foe was sixty years old. It is founded on the actual adventures of a Scotchman named Alexander Selkirk, who spent several years alone on Juan Fernandez Island in the Pacific, west of Chile. The incidents are drawn up out of the writer's own imagination. This boy's story is considered the beginning of stories and novels of adventure. It has been translated into the principal languages of the globe, and has been read with pleasure by more boys than any other book ever penned. "Nobody," said Dr. Johnson, "ever laid it down without wishing it longer." In his treatise on educational theory Rousseau says, "My Emile shall read this book (meaning *Robinson Crusoe*) before any other; it shall for a long time be his entire library, and shall always hold an honorable place. It shall be the text, on which all our discussions of natural science shall be only commentaries."

The success of this book encouraged De Foe to write several more—among others, *The Journal of the Great Plague in London.* It is an interesting book. It pretends to be written by an eye witness, though the plague had passed ere De Foe was six years old. It is written in so vivid a style, as by a shopkeeper, that it has been supposed by many to be a history of that event.

Some idea of De Foe's personal appearance may be had from the description offering a reward of $250 for his arrest: "A middle-sized, spare man, about forty years old, of a brown complexion, and dark-brown colored hair, but wears a wig; a hooked nose, a sharp chin, gray eyes, and a large mole near his mouth."

See SELKIRK.

Degeneration, a loss or impairment of the qualities peculiar to a certain race or kind, or to a certain type. The term is applied to the loss or impairment of natural or proper qualities of human beings and other living things, including plants and the lower animals. It refers to both physical and moral qualities, and indicates descent to an inferior state. Maudsley, in *Body and Will,* says: "Degeneration means literally the undoing of a kind, and in this sense was first used to express the change of kind, without regard to whether the change was to perfect or to degrade; but it is now used exclusively to denote a

change from a higher to a lower kind; that is to say, from a more complex to a less complex organization. It is a process of dissolution, the opposite of that process of involution which is pre-essential to evolution."

In physiology, the term degeneration is used to indicate any process by which a tissue or substance becomes replaced by some other which is regarded as less highly organized, less complex in composition, of inferior physiological rank, or less suited for the performance of its original functions. One who has declined in physical or moral qualities is called a degenerate, or degraded, being; and Shakespeare uses the term adjectively in 3 Henry VI, when he says:

Farewell, faint-hearted and degenerate king,
In whose cold blood no spark of honor bides.

Physical degeneration in human beings or the lower animals is indicated by certain tissue changes which may result from a variety of conditions, such as age, malnutrition, infectious diseases, poisons, etc. In such changes the cells of the body are affected, as by albuminous degeneration, which is the type most often accompanying infectious diseases. In such cases, while any of the body cells may be affected, those of the liver, kidney and mucous membranes suffer most frequently; the cells become swollen, and may even disintegrate. Fatty degeneration is the process by which the protoplasm of the cells of various organs is converted into fat grains or drops; and there are various other forms of degeneration distinguished by the pathologist.

Relation to Evolution. Throughout the animal and vegetable kingdoms, the process of degeneration is seen, as a factor in evolution. From the very beginning of life, the progressive development of organic forms is attended by changes in the organs or the entire organism, either from lack of nutrition or disuse. The evolution of almost every organism, particularly of the most highly specialized animals, is a process of the development of one part at the expense of another. If one part is developed by use or exercise, and consequent increased nutrition, adjoining parts, or less useful parts or organs, degenerate by being allowed to remain stationary. Thus, in the evolution of a race or class of beings, or of an individual, there is a competition or struggle for existence, first between the cells and then between the different organs, especially those most concerned with the outer world. The structural development of animals therefore changes in favor of those parts or organs which receive the most exercise and nourishment, while the less useful or less favored suffer from degeneration; that is, they languish and dwindle, remain only mere vestiges of their former state, or die of atrophy.

Principal Forms. Four principal forms of degeneration have received scientific recognition; namely (1) degeneration during the growth of the individual, or the development of a class or race; (2) degeneration of the individual, either partial or total; (3) social degeneration, often affecting whole peoples, due to mental, moral or physical causes, or to institutions like slavery; (4) moral degeneration of the human individual, which produces mental degenerates and criminals. All animal parasites are made up of forms in different stages of degeneration, and an important characteristic of the process is the atrophy, or loss through misuse and decay, of certain parts of the organism.

Influence of Environment. In mankind, degeneration on a wholesale scale is seen in the effects of slavery and the slave trade in Africa. These effects are observable not only in the native races enslaved, but also in the deterioration of many white men of the master races. There are many other instances of racial degeneration; for example, the natives of Australia, who are probably a branch of a former superior race of India; the Hindoo gypsies, a broken-down, low-caste people; and the inhabitants of Terra del Fuego, in South America, a degenerate tribe of the American Indian race. Mental and moral degeneration of individuals is seen in examples like the assassins of Presidents Lincoln, Garfield and McKinley, certain Nihilists and murderous Bolshevists of Russia, the notorious Jukes family of the state of New York, incorrigible criminals, and

the morons, who commit infamous crimes against women and children.

Degree, a term denoting the academical rank or grade which a student has attained. The three degrees granted are those of bachelor of arts, bachelor of science and bachelor of literature, usually bestowed when the recipient has completed a four years' course in the department named, and as prescribed in the college curriculum. There is a lack of uniformity in the various colleges of the United States in the granting of these degrees, however. Honorary degrees, usually doctor of divinity or doctor of laws, are conferred in recognition of the recipient's attainments in letters, science or philosophy.

De Kalb, Johann (1721-1780), a German-American soldier, and general in the Revolution. He was a native of Bavaria, but entered the French service in 1743, attaining the rank of brigadier-general. In 1777 he accompanied Lafayette to America and was made major-general in the American army. He joined the main army under Washington, serving later in New Jersey and in Maryland. In 1780 he was made second in command under General Gates, and lost his life in the battle of Camden.

Dekker, or **Decker, Thomas** (1570-1637 or later), an English dramatist. Little is known of his life, except that he lived in London, wrote about twenty-eight dramas alone, and many others in collaboration with Massinger, Ford, Webster, Rowley, Middleton, and others. He excelled in scenes laid in shops, inns, taverns, and the like.

SAYINGS.

Turn over a new leaf.

Honest labor bears a lovely face.

This principle is old, but true as fate,—
Kings may love treason, but the traitor hate.

De Koven, Henry Louis Reginald (1859-), an American composer. He was born at Middletown, Connecticut, but received his education in Europe where he was taken at the age of eleven. He was graduated from Oxford in 1879, then studied music in various European cities. His first opera, *The Begum,* was produced in 1887. Since then De Koven has devoted his time to composing light opera and songs, many of which have become widely known. Among his operas may be mentioned *The Mandarin, Maid Marion, The Fencing Master, Don Quixote.* Popular songs are *O Promise Me,* and *The Armorer's Song.*

Delagoa Bay, an inlet on the south-eastern coast of Africa, discovered by the Portuguese in 1498. It is the terminus of a railway connecting the Transvaal with the seacoast.

Delaine, de-lān′, a plain-woven, light-weight, woolen dress fabric. The name is French, originally *mousseline de laine,* or muslin of wool, and indicates that the fabric, while made of woolen threads, is woven like muslin. It was very popular in Europe and America from 1840 to 1875. The fabric was dyed in plain colors, and printed or left plain. At the present time, challis, a similar material, but finer and softer, has taken its place almost entirely.

Deland, Mrs. Margaret Wade Campbell, an American novelist. She was born in Allegheny, Pennsylvania, in 1857. She was educated at the Cooper Union, New York, and for some time was a teacher of drawing. She was married in 1880 to L. F. Deland. Since her marriage she has resided in Boston. Her first novel, *John Ward, Preacher,* published in 1888, attracted wide notice. It is the story of a woman whose soul revolts against the accepted religious beliefs which her husband preaches. *Philip and His Wife* deals with the divorce question. *The Awakening of Helena Ritchie* is a much later story, and unquestionably the best of Mrs. Deland's novels. Its vital question is that of the responsibility of one human life to all life, and it teaches that renunciation for the common good is repaid in spiritual growth and development. Mrs. Deland is best known by her short stories which have won her a place among the "representative story-tellers of America." These, published originally in the magazines, have been collected in two volumes, *Old Chester Tales* and *Dr. Lavender's People.* They are stories of Pennsylvania village life. Most of them, like the novels, deal with some ethical problem. They display a fine discrimination in the peculiarities of character, a clear

beauty, and delicacy of touch, which has led to a comparison with the work of Jane Austen. Mrs. Deland, however, displays the greater depth of feeling and wider sympathy. She strikes at the root of spiritual growth or spiritual stagnation, as the case may be. Among her characters, Dr. Lavender and the irresistible David are genuine creations.

Delaware, one of the original thirteen states. It lies on the west shore of Delaware Bay. Maryland, Pennsylvania, and New York are its neighbors. Area, 2,050 square miles. It is intermediate in size between Rhode Island and Connecticut. By the fourteenth census the population was reported at 223,003. The state consists of three counties—Newcastle, Kent, and Sussex. The capital is Dover, situated near the central part of the state. Wilmington, the metropolis, is a manufacturing city. It has an excellent harbor. It has long been noted as a shipbuilding center. The first iron sailing vessel built in this country left the docks of Wilmington in 1854. The style of making printers' paper in large rolls instead of sheets was introduced here in 1817. The greatest powder works in America, those of the Du Ponts, are located near Wilmington. Large canning works, flour mills, boiler factories, car shops, and tanneries are among the manufacturing industries. Morocco leather is dressed in large quantities.

The northern county is rough or rolling. Granite, kaolin, suitable for porcelain, and brick and terra cotta clays are among the most prominent mineral productions. The shipbuilding industry has about exhausted the white oak of the region. Valuable cypress is still found around the edges of the swamps, in which wild fowls abound.

Delaware is the most decidedly agricultural state in the Union. The three counties represent roughly quite distinct physical regions. The farther south, the more level the surface and the sandier the soil. Eighty per cent of the entire state is included in farms. Sixty per cent is under actual cultivation, a greater proportion than in any other state of the Union. Grain raising and general farming are carried on to some extent in Newcastle County, but the greater part of the state is devoted to gardening and raising of fruit for the markets of Baltimore, Philadelphia, and New York. In some years as many as 4,000,000 baskets of peaches are marketed, with other orchard fruits, as pears, apples, and plums in proportion. Immense quantities of blackberries, raspberries, and strawberries are raised. Tomatoes and sweet corn are put up by the million cans. The dairy interests of the state are also important.

The first settlement in Delaware was made by the Dutch in 1631. In 1638 the Swedes colonized this region, the only attempt made by them to gain a footing in the New World. An old Swede church built in 1698 still stands in Wilmington. In 1655 Governor Stuyvesant of New Amsterdam, now New York, required the Swedes to submit to Dutch control. In 1682 the colony passed with New Amsterdam under English rule. In 1683, in order to control the Delaware River, William Penn bought the colony. It was a part of Pennsylvania until the time of the Revolutionary War. Delaware was the first state to ratify the national Constitution. At the outbreak of the Civil War it was a slaveholding state, but, being under Northern rather than Southern influence, did not secede. The state is represented in Congress by one representative and, of course, two senators. The name is derived from that of the river and bay, which were named for Lord de la Warr.

STATISTICS. The following are the latest reliable statistics available:

Land area, square miles	1,965
Water area, square miles	405
Population (1920)	223,003
White	192,662
Negro	30,341
Chief Cities:	
Wilmington	110,168
Dover	4,042
Number of counties	3
Members of state senate	17
Members of house of representatives	35
Salary of governor	$4,000
Representatives in Congress	3
Assessed valuation of property	$185,283,517
Total indebtedness	$2,066,785
Farm area, acres	944,511
Improved land, acres	653,052
Corn, bushels	6,549,000

Wheat, bushels	1,300,000
Oats, bushels	168,000
Tomatoes, tons	9,820
Domestic Animals:	
Horses	33,000
Mules	6,000
Milk cows	45,000
Other cattle	22,000
Sheep	8,000
Swine	68,000
Manufacturing establishments	668
Capital invested	$148,207,598
Raw material used	$85,432,933
Operatives	29,035
Output of manufactures	$165,073,009
Miles of railway	335
Teachers in public schools	1,134
Pupils enrolled	40,180

Delaware, or **Lenape,** an Algonquian tribe of the American Indians, which, early in the 16th century, occupied the valleys of the Delaware and Schuylkill rivers. These Indians were noted for their courage and wisdom, and exerted a great influence over neighboring tribes from the Hudson to the Chesapeake. When the Iroquois Indians rose to power, that of the Delaware dwindled, and they gradually lost their independence. In 1774, the Iroquois denied the Delaware the right to alienate their lands, and as a result they removed to the banks of the Susquehanna. In 1781, 400 Moravian Delaware were driven from their settlement on the Muskingum by hostile Indians, but when they were allowed to return the following year, the British considered them hostile, and about 100 were massacred. In 1778 they made a treaty of amity with the United States, when the latter agreed to build them a fort for their protection, which was the origin of Fort McIntosh. In 1795, together with the Wyandot, Shawnee, and other western tribes, the Delaware were parties to the general pacification of Fort Grenville. This was further strengthened by the treaties of Fort Wayne, in 1803, and Vincennes, in 1804, and the frontiers remained unmolested until the movement of Tecumseh in 1811. The Delaware slowly drifted westward, stopped for a time at White River, Indiana, and after crossing the Mississippi, settled on rich tracts of land in Kansas, where they owned a large area on the Kansas River; here they busied themselves in agricultural pursuits. To a large extent they dressed in civilized costume, and the United States held in trust for them quite a large sum of money. But difficulties arose between them and immigrants to Kansas, chiefly due to the encroachment of the whites on the Indian lands, this resulting in the removal of the Delaware in 1870 to a reservation in Indian Territory. Later they became incorporated with the Cherokee.

Delaware, a river in the United States, which rises in the Catskill Mountains in New York, and separates Pennsylvania from New York and New Jersey, and New Jersey from Delaware. It empties into Delaware Bay. Its length is about 360 miles to the Delaware Bay, and it drains an area of 12,012 square miles, of which one-half is in Pennsylvania, one-fourth in New York, and one-fifth in New Jersey. It is navigable for large vessels to Philadelphia, and for smaller vessels to the head of tidewater at Trenton. Here it has considerable fall and furnishes abundant power. Its chief tributaries are the Schuylkill, the Lehigh and the Lackawaxen, from Pennsylvania, the Mongaup and the Neversink from New York, and the Musconetcong and Maurice from New Jersey.

Delcasse, Theophile (1852-), a distinguished French statesman and diplomat whose proposal for settling the Chinese question after the Boxer uprising was accepted by the European powers. He was born in Pamiers, department of Ariege, M. Delcasse was attached to the staff of *La Rupublique Francaise* for a time. He wrote many brilliant articles on foreign politics, and in 1894 was made Colonial Minister in the Deputy Cabinet. From 1898 to 1905 he was Foreign Minister, and Minister, of Marine from 1905 to 1913. M. Delcasse arranged the differences that arose between France and England from the occupation of Fashoda by the Marchand expedition.. In 1902, M. Delcasse refused the candidacy for President of the Chamber of Deputies. During 1913-14 he was the French Ambassador to St. Petersburg, and in 1914-15 was Minister of Foreign Affairs.

Delectable Mountains, The, in Bunyan's *Pilgrim's Progress,* a chain of mountains within sight of the Celestial City. The mountains were covered with "gardens and orchards, vineyards and fountains of water." Christian and Hopeful were welcomed and refreshed by the shepherds who fed their flocks there. From these mountains, too, the Pilgrims obtained their first faint glimpses of the gates of the City and "some of the glory of the place." See BUNYAN.

De Lesseps. See LESSEPS.

Delft, a city of Holland. It is situated on a level plain eight miles northwest of Rotterdam. It is intersected by canals crossed by half a hundred bridges. Present population, 44,000. Delft was once a fortified city, the seat of the Orange family, whose burial place is here. It is noted as the place of the manufacture of Delft pottery during the fourteenth century. The ware was made of a clay found here. It was ground, mixed, and allowed to ripen. It was then moulded on the potter's wheel and partially burned. An enamel made of sea kelp, sand, lead, and tin, with cobalt for blue, was brought to the consistency of thick paste and then applied. The delicate ware was then inclosed in coarse pottery to protect it from smoke, and was kiln-burned. Old Dutch ware of the Delft sort is prized highly by collectors. See POTTERY.

Delhi, the ancient capital of Hindustan. It is very nearly equidistant from Bombay and Calcutta, to both of which railways have been built. In the time of the Great Mogul, Jehan, it had a population of 2,000,000. He built the palace of the Great Mogul, the most magnificent and interesting structure of the kind in India. It rivals the kremlin of Moscow. A mosque of white marble and red sandstone was built by the same monarch. It cost half a million dollars. The modern city is surrounded by a wall thirty feet high, defended by towers and pierced by eleven gates. Delhi College, founded in 1792, and attended by several hundred students, maintains instruction in the English, Persian, Arabic, and Sanskrit languages. Delhi, with its surrounding ruins of tombs and palaces, has played an important part in the history of India, and, at the last durbar, it was named as the capital of India instead of Calcutta. It is noted for several industries, such as the weaving of cashmere shawls and the making of goldsmith's work of wondrous delicacy and beauty, especially gold embroidery. The people are half Hindu, half Mohammedan.

As a result of the transfer of the seat of government a new Delhi, large and modern, has been under construction since 1912. The site chosen for the new city was the eastern slopes of the hills south of the present Delhi, which will remain after the new city is finished. Population of old Delhi, in 1921, 303,148. See INDIA.

Delilah, a celebrated Philistine woman of the Old Testament whom Samson loved. By her blandishments she prevailed upon Samson to reveal to her the source of his great strength, which lay in his long hair. While Samson was asleep, Delilah cut his locks, and then betrayed him to the Philistines, by whom he was captured and held prisoner until his death. (Judg. XVI: 4-31).

Delirium, a mental condition caused by illness, in which the reason and intellect are perverted or lost, while the imagination and passions are often without control. Delirium is not uncommon in severe cases of typhoid, but it is usually of the quiet type. A more active type is manifested in delirium tremens (which see).

Delirium Tremens, de-lĭr′ĭ-ŭm trē′-mĕnz, a wandering of the mind due to prolonged intoxication. The victim of alcoholic beverages, opium, belladonna, cocaine, and other drugs is overtaken by an ungovernable trembling of the body, loss of appetite, and wakefulness, and is subject to illusions of the senses, such as seeing darting, hissing serpents and hearing terrifying noises when there are none. Rest, quiet, sleep, and a restored appetite are depended on to effect a cure; but the victim is frequently but a quaking shadow of his former self, will and energy quite gone. It is properly an alcoholic derangement of the nervous system.

De Long, George Washington (1844-1881), an American explorer. He was

born at New York, August 22, 1844, and died in Siberia, October 30, 1881. He was a graduate of the United States Naval Academy, and had experience in Arctic navigation. In 1879 James Gordon Bennett, Jr., proprietor of the New York *Herald,* fitted out the Jeanette for a three years' voyage of Arctic exploration. By permission of the government, De Long took command. He sailed from San Francisco, passed through Bering Strait, and cruised along the north coast of Asia. The vessel was caught in an ice pack and crushed June 13, 1881. With fourteen companions De Long reached the delta of the Lena in Siberia. Two men were sent forward to obtain relief. The rest of the party perished of cold and starvation. Their bodies were discovered and interred by another party of the crew who had found shelter in a small village on the Lena. See FRANKLIN; NANSEN; ARCTIC REGIONS.

Delos, dē′lŏs, a rocky island in the Grecian Archipelago, the smallest of the Cyclades. It is about two miles square. In the mythological account Delos was raised from the bottom of the ocean by Poseidon, and for some time was a floating island moving from place to place. Hera, the wife of Zeus, was jealous of Leto, one of Zeus' favorites. The wrathful Hera bound Earth by oath to allow Leto no resting-place. Leto, known to the Romans as Latona, wandered over the world until at last she found this floating island, which, as it was not stationary, was not included in Earth's promise. Here Leto gave birth to twin children, Apollo and Diana, and henceforth the island was sacred to Apollo. Zeus chained Delos to the bottom of the ocean that it might be a safe home for Leto.

Historically, the Ionians were the first inhabitants of Delos. A yearly festival was held here in honor of Apollo. After the fall of Corinth Delos became an important commercial center. It had an excellent harbor and was in the direct route from southern Europe to Asia. It is said that 10,000 slaves changed hands in one day at this place. A beautiful temple, erected in honor of Apollo, stood on the island. It was built of Parian marble, and contained a famous statue of the god and an altar in the shape of a cube. Once, in time of pestilence, the people consulted an oracle and were told to "double the altar of Apollo." Several ancient mathematicians attempted to solve the problem of doubling this cube. Hence the doubling of a cube is still called the Delian problem. Delos was devastated during the Mithridatic War, and never regained its former prosperous condition. The old town of Delos is only a mass of ruins, but remains of the temple may still be seen. The island has no permanent inhabitants. A few shepherds and goatherds from neighboring islands may be found there with their flocks during the summer season.

See DOUBLING THE CUBE.

Delphi, dĕl′fī, a city of ancient Greece. It stood in a grand amphitheater at the southern base of Mt. Parnassus, sacred to the Muses. The springs of Castalia still break forth here, and find their way to the sea eight miles distant. The city was famous as the seat of the Pythian games, the Delphic oracle, and the worship of Apollo. The various temples were adorned with innumerable statues. Nero carried away 500 bronze objects of art. Pliny says there were 3,000 statues in Delphi in his day. As the temples were sacred the priests were entrusted with the care of treasure. None the less, the temples were plundered occasionally, as in time of war. The oracle was consulted in the following way. The priestess, at first a young woman, later a woman not under fifty, was bathed in water from the fount of Castalia and crowned with the laurel wreath sacred to Apollo. The Pythia, as she was called, was then conducted to a cave in the interior of the temple, and seated on a holy tripod or three-legged stool over a fissure in the rock, from which intoxicating vapors rose. Under the divine influence of Apollo the priestess became seized with a fit of prophecy. Amid her writhings and contortions and shudderings and groans, half articulate words escaped. These the attendant priests, stimulated by rich presents, took down with care, and framed into hexameter utterances. These verses were delivered to the anxious

inquirer as the message vouchsafed by Apollo in reply to his inquiry. Many celebrated responses are recorded. Croesus was told, "The war will destroy a great empire." He was left to find out later that the empire to be destroyed was his own, not that of Cyrus as he had supposed. Themistocles received a response to the effect that the safety of Athens lay in wooden walls. This he construed to be favorable to the building of a navy, etc. Probably the thoughtful men of the day regarded the oracle as an imposture, but used it as a means of leading the people.

Delsarte' System, a system of physical training, the primary purpose of which is dramatic expression. The system takes its name from François Delsarte, a Frenchman, who was born at Solesme in 1811, and died at Paris in 1871. Delsarte was a student at the conservatory, expecting to become an opera singer, when he lost his voice, and in consequence turned his attention to teaching the arts of musical and dramatic expression. He met with marked success and gradually elaborated the system he had originated. His aim was to make elocution a science, feeling that a system of formulated laws might have saved his own voice which he thought had been lost for lack of guidance. He taught that voice is the language of life; gesture, the language of the emotions; and articulation, the language of reason. In perfect dramatic expression all these languages must be brought into play. Every organism must be so developed as to perform its part perfectly in the whole scheme of expressing thought and feeling.

The Delsarte system commences with gymnastics of an aesthetic character. One is taught to relax utterly, in other words, to withdraw will-power from various parts of the body, first from the fingers and then from the hands, arms, feet, legs, waist, hips, spine, head, jaw, eyelids. The harmonic poise of bearing and the significance of bodily pose are subjects that receive attention, while specific study is made of expression by means of the hand, the arm, the eye, the lips, and the head. On the principle that "gesture precedes speech" much attention is given to expression in pantomime. The Delsarte system was introduced in this country shortly after the death of its originator. It has found many advocates who claim that it is of special value not only to those preparing for the stage, but also to all who would develop nerve control.

Delta, a triangular tract of new land at the mouth of a river, so called from its usual resemblance to the letter Δ or *delta* of the Greek alphabet. A river brings down a large quantity of fine soil or silt, which is deposited in quiet water at its mouth, and builds up a fan-shaped plain. The Rhone is building a delta in the upper end of Lake Geneva and one at its mouth, where it empties into the Mediterranean. The city of Arles, once near the mouth, is now thirty miles inland. The Po has built up a plain fourteen miles beyond the old seaport of Adria which gave its name to the Adriatic Sea. Its delta advances at the rate of fifty feet a year. The Nile carries 17,000,000 tons of silt into the Mediterranean annually. Its delta is already ninety miles out at sea, and has an outside border of 180 miles. The delta of the Ganges and its sister stream now has an area of 60,000 square miles, and extends seaward over 200 miles beyond the old continental seacoast. The Danube carries down 20,000,000 tons of silt a year; the Rhine a fourth as much. The Thames is short, and carries but 613,000 tons a year. The Hudson, flowing through a rocky country in part, carries but two-thirds as much silt as the Thames. The Mississippi carries 112,832,171 tons of silt a year. Its delta, on which New Orleans is built, has an area of 12,000 square miles. It is already two hundred miles in length, and is advancing into the Gulf at the rate of a mile in sixteen years. The depth of the alluvial soil at New Orleans is estimated to be not less than 700 to 1,000 feet. Deltas not infrequently fill up lakes and cause them to disappear, but quite as often a branch stream builds up a delta in a main channel and dams the water back, thus creating a lake. This is true in the case of Lake Pepin, whose waters are held back by a delta in the upper Mississippi formed at the mouth of the Chippewa, a Wisconsin branch of

the Father of Waters. The soil of a delta is considered extraordinarily fertile. See RIVER; JETTY.

Deluge, the great flood that prevailed in the days of Noah. The wickedness of man; the piety of Noah; the building of the ark; the breaking up of the fountains of the deep, and the opening of the windows of heaven; the rain of forty days and forty nights; the preservation of beast and fowl and creeping thing; the prevalence of water on the face of the earth; the resting of the ark on Mount Ararat; and the sending forth of the raven and the dove, are told in chapters vi, vii, and viii of Genesis. A former opinion, that the deluge of Noah was universal, has given way to the view that it was local. Similar traditions are preserved by many peoples. The most notable is that of the Chaldeans, a people akin to the Hebrews. It was found inscribed in cuneiform characters on clay tablets, and was made known in 1872. The Chaldean deluge reached its height in seven days. The ark rested on a mountain in eastern Kurdistan; the Noah-like hero of the Chaldean flood sent forth a raven, a swallow, and a dove.

Demeter, dĕ-mē′ter, in Greek mythology, one of the principal twelve deities. Demeter was the goddess of seed and harvest—the symbol of the nourishing and fertilizing principle in nature. She was the daughter of Cronos and Rhea, and mother of Persephone. The Greeks considered that good crops depended upon the payment of proper respect to this goddess. They annually offered bulls, cows, pigs, honey cakes, and fruits upon her altars.

The myth of chief importance in the worship of Demeter related to Persephone. Zeus, Persephone's father, promised her in marriage to Hades, god of the lower world. Enticing the maiden to wander away to gather flowers in the field of Enna, Sicily, Zeus caused the earth to open, thus giving Hades an opportunity to carry her away. Demeter heard her daughter's cries, but had no suspicion of what had happened. She searched for Persephone through the whole earth. Finally Helios, the sun god, told Demeter that Hades had stolen her. The fountain Arethusa brought the sad mother news from her daughter. "While passing through the bowels of the earth," she said, "I beheld your Persephone. She is sad, but she reigns as queen in Erebus." Demeter vowed she would never return to Olympus without her daughter. Moreover, she afflicted the whole earth, since it had opened to receive her child, with sterility. Zeus sought by every means he could devise to induce her to break her vow. At last, fearing lest the race of men should perish, Zeus sent Hermes to Erebus to bring Persephone back. Hades was induced to let his wife return to her mother; but the wily monarch gave her a pomegranate, which she ate. Having eaten of the fruit of Erebus, Persephone could never altogether leave the infernal regions, but was thenceforth compelled to spend there a part of each year. Demeter, content with her daughter's presence for two-thirds of the year, restored fertility to the earth. She taught Triptolemus, whose parents had pitied her sorrows, to use the plow and to sow seed.

This story is symbolic of the growth of grain which must remain in the dark ground unseen for a time, as Persephone must remain in Erebus. Demeter was identified by the Romans with their Ceres. Demeter is represented in ancient monuments as a beautiful woman of matronly appearance. Her face has a kindly expression. She is standing in a chariot drawn by dragons, her head crowned with a garland of wheat. A torch is in one hand and a sheaf of wheat or poppies in the other.

See CERES; HADES.

Demidoff, a wealthy family of Russia. The founder of the family lived 1665-1720. He was the son of a serf. He established the first foundry in Siberia. Peter the Great employed him to cast his cannon, and gave him the working of mines that brought in wealth. His son continued the working of the copper, silver, and iron mines of the Urals; and grandsons, following the same industries of mining and casting, amassed colossal fortunes. Nicolai Demidoff, who died in 1828, had an income of $1,000,000 a year. The family is a worthy one; various members have been

distinguished for philanthropy, progressive political ideas, scholarship and taste for art. Paul Demidoff (1738-1821), traveler and scientist, gave a museum of natural history to the University of Moscow.

De Mille, James (1833-1880), a Canadian educator and novelist, was born at Saint John, New Brunswick, and was graduated from Brown University in 1854. From 1860 to 1863 Dr. De Mille was professor of classics at Arcadia College, and from 1865 until his death occupied the chair of rhetoric and history at Dalhousie University. Dr. De Mille wrote thirty or more novels, of which the best are *Helena's Household,* a story of Rome of the first century, and *A Strange Manuscript Found in a Copper Cylinder,* published after his death. His other important publications are *The Dodge Club,* a humorous travel book; *The Lady of the Ice, The Comedy of Terrors, The Living Link, The Soldier and The Spy,* and *Andy O'Hara.* In addition to these, he also wrote *The Winged Lion, A Castle in Spain* and a *Treatise on Rhetoric.*

Democracy, a government by the people. It is not a primitive form of government. Savage tribes are governed usually by a chief, sheik, or other leader. The earliest approach to a pure democracy is the town meeting in which each has a voice in the adoption of regulations and the election of officers. Democracy is entirely opposed to the idea of leading families, inherited dignities, and permanent officeholders. As communities grow larger and expand into commonwealths, it is impossible for all the voters to get together. Some one has said that a pure democracy must be able to gather within hearing of a single voice. When the number of voters becomes too large for such an assembly it is necessary to elect representatives to perform the actual work of making laws. In the farming regions of the United States local matters are still managed in a democratic way; but in city, state, and national affairs, business is transacted by representatives who are for their term of office out of reach of the people. Speaking of the United States, President Eliot of Harvard, says:

> After observing the facts of a full century, one may therefore say of the American democracy that it has contracted public debt with moderation, paid it with unexampled promptness, acquired as good a public credit as the world has ever known, made private property secure, and shown no tendency to attach riches or to subsidize poverty, or in either direction to violate the fundamental principle of democracy that all men are equal before the law.

Democratic Party, one of the chief political parties in the United States. Its distinguishing doctrine is that of giving the central government as little power as possible. Historically, it is opposed to a strong central government. The first cleavage into political parties was that of Federalists and Anti-Federalists, the former in favor of adopting the United States Constitution, the latter opposed to it on the ground that it gave the government dangerous power. Out of the various Anti-Federal elements, Thomas Jefferson formed the party which has continued to the present time. It was known at first as Republican, then as Democratic-Republican, and finally as Democratic, a name still retained. The Democratic party is strongest in the South. The following presidents have been elected by the Democratic Party:

Thomas Jefferson,	James K. Polk,
James Madison,	Franklin Pierce,
James Monroe,	James Buchanan,
Andrew Jackson,	Grover Cleveland,
Martin Van Buren,	Woodrow Wilson.

If we except the administration of George Washington, who was elected by the whole people, we may say that the Democratic administrations have extended over 64 of the 124 years, from the inauguration of John Adams to 1921, the time of the inauguration of Warren G. Harding.

See REPUBLICAN.

Democ'ritus (460-370 B. C.), a Greek philosopher, noteworthy as the founder of the ancient atomic philosophy. He was born at the Thracian colony of Abdera, notorious for the stupidity of its inhabitants. Little that is historical can be told of his life. The dates given for his birth show a disparity of thirty-four years. His father is mentioned under three different names. It is believed that Democritus traveled for several years, spending some time in Egypt. The story was current among the ancients

that he put out his own eyes that nothing might distract his attention from his meditations, which is but a figurative way of expressing the fact that he was a profound thinker. Of a few facts we are certain, that he acquired great learning, lived to be a very old man, and left at his death seventy-two works, the subjects of which included all branches studied in his day. His style was of such beauty that Cicero compared it with Plato's. Of all these works only a few fragments remain, which is a matter for regret.

According to the theory of Democritus, atoms are the ultimate material of all things, even of spirit. These atoms have existed from all times and are indestructible. They vary in shape, are invisible, and are in constant motion. Since soul is of the same material as body, the two perish together. Democritus was of course counted as a sceptic among the ancients. Tradition credits him with saying, "There is nothing true and if there is we do not know it." Democritus, however, was of an optimistic habit. He taught that tranquillity of mind was the greatest good, and therefore all disturbing influences should be avoided. Living up to his principles he shunned all evils that he could and smiled at all the rest, winning thereby the nickname of "the laughing philosopher."

De Morgan, William (1839-1917), an English novelist. He has won his reputation in a surprisingly short time. His American publishers tell us that he is "of an artistic and inventive turn of mind," that he has invented a duplex bicycle, "the most effective sieve in existence," and a fire grate which will consume its own smoke. He has been interested for years in ceramics; De Morgan tiles are considered especially artistic in England. William De Morgan is the son of Augustus De Morgan, a distinguished mathematician, a professor in University College, London. The elder De Morgan is the author of several mathematical works and of *A Budget of Paradoxes,* of which Holmes says: "Few persons ever read it through. Few intelligent readers ever took it up and laid it down without taking a long draught of its singular and interesting contents."

William De Morgan began his first novel, *Joseph Vance, an Illwritten Autobiography,* when sixty-four years of age. It was rejected by the publishers. Before making a second attempt to have the work printed, the author decided to have it typewritten. The woman who had this work in charge told a publisher that her girls were "reading the manuscript and crying over it," instead of copying it. It is hardly necessary to add that the story very soon appeared. *Joseph Vance,* as well as De Morgan's other stories, is a revival of the long, slow, old-fashioned way of story telling—the way of Dickens and Thackeray. To the reader of modern fiction, wearied with the strain of grasping the whole course of a human life, not to mention a philosophy of existence and a scheme of the universe in the reading of half a dozen pages, the story of *Joseph Vance* comes like "the shadow of a great rock in a weary land." Knowing that a man lives who had time to write it, we begin to feel that we may have time to read it.

Alice-for-Short, another novel by De Morgan, published in 1907, is somewhat more dramatic. It has been called " a genial ghost-and-murder story." Like *Joseph Vance,* its most striking characteristic is the author's love for what is human in his fellow beings. One critic says of it, "By every law of fiction, it should be a bore—as a matter of fact it is not." De Morgan's last and strongest story, *Somehow Good,* appeared in 1908. It is a story of the present, full of pathos and humor. It has more of plot than *Joseph Vance*, while lacking none of the human sympathy, the wholesomeness, and the wisdom of those earlier stories. All three of these stories have the peculiar effect of inspiring the reader with the fixed conviction that they recount actual occurrences and experiences of the writer. They are, of course, based on the author's knowledge of human life and character, but the incidents and personalities are almost wholly imaginary.

In my personal opinion, *Joseph Vance,* this "ill-written autobiography," is wise, witty, gentle, and of unflagging interest; but then I have been frightfully prejudiced in its favor—by reading *it*!—**Mary Moss.**

DEATH OF DEMOSTHENES

How can any appeal be made to the principles governing the art of fiction, in the case of *Joseph Vance,* a book which abides by no rule, and yet remains, when all is said, a beautiful work of art? Only a pedant could drag in matters of form and the like, with reference to a work so interpenetrated with human tenderness that the laying of academically critical hands upon it must seem merely an act of obtuse impertinence. . . . Mr. De Morgan is a novelist worthy of the old school. He has written just such a book as his famous predecessors were wont to write, a book to turn around in—a long, absorbing, and ennobling story.—Royal Cortissoz in *N. Y. Tribune.*

Joseph Vance is the first great English novel of the twentieth century.—Lewis Melville.

Demosthenes (385-322 B. C.), the greatest of Greek orators. He was a native of Athens. From his parents he inherited property and an ambition to distinguish himself as a public speaker. He studied rhetoric under the ablest teachers of the day. The accounts that have reached us of his early education inform us that he suffered from an impediment in his speech. He was so determined, however, to fit himself for public speaking, that he practiced with pebbles in his mouth, and frequented exposed caves on the coast, where he tried to make himself heard above the noise of the waves. In order to form his style he is said to have rewritten the history of Thucydides several times, much as Benjamin Franklin rewrote Addison's essays for the same purpose. Philip of Macedon, the shrewd father of Alexander the Great, endeavored to secure entrance for Macedonia into the councils of Greece. Demosthenes opposed Philip with all his power. His orations against Philip—Philippics, they are called—are regarded as the finest specimens of Greek oratory. He characterized Philip as a despot, against whom there was but one safeguard to a democracy; namely, distrust. He also delivered a famous oration on the occasion of dedicating a funeral mound to the memory of those who had fallen near Chaeronea. Another famous oration, that on the crown, was called forth by the acts of a political adversary whom he drove into exile. Demosthenes is credited with pure motives and sincere patriotism in opposing the designs of Philip and Alexander. Finally, however, the Macedonian influence became too powerful for him. He fled from Athens, and resided at Aegina. After the death of Alexander he returned to Athens, but was again exiled by Alexander's successor, Antipater. According to general accounts he became weary of being hunted, and ended his life by taking poison. A complete edition of his works contains 123 writings, including 61 orations. Some of these, however, are not considered genuine.

Demurrage, in shipping, a charge made by a shipowner and paid by the owner of freight for delaying a ship in port beyond a reasonable time, usually specified in a contract. It is only fair that the carrier, who is paid by the ton, should not be delayed by tardiness in loading or unloading, or by detention in port by authorities who deem it necessary to inspect a cargo or even to hold it in quarantine. The owner of the goods, however, cannot be required to pay for time lost on account of war, bad weather, breakage of machinery, or misconduct of an officer or of a crew. In the latter case, the owner of the goods has a just claim.

In railroading, demurrage is a claim made upon the carrier, that is to say, the railroad company, for damages caused by improper delay or careless handling; as in case perishable fruit is delayed too long or glassware is broken in transit. A charge very similar to that made by a shipowner is made by railroads, usually for unnecessary delay in loading and unloading cars. Some railroad systems allow two days for loading and two days for unloading. A nominal charge as say one dollar a day is made for detention beyond that time. This regulation is considered entirely fair. Were it not that some charge were made shippers might order cars and hold them for a long time before loading. Receivers of goods might let cars stand on the track, awaiting their tardy convenience. In this way other shippers would be deprived of cars needed for transportation.

Modern legislatures have established the doctrine of reciprocal demurrage. Under laws recently enacted a railroad company is allowed a reasonable time to furnish the shipper a car. Further delay is penalized by a charge of so much per day.

Denarius, a silver coin of the Roman Republic and Empire. It was worth about sixteen cents of United States money. It is the silver penny of the New Testament. "Shew me a penny. Whose image and superscription hath it? They answered and said, Caesar's." Luke xx: 24. The abbreviation *d.* for the English penny is derived from the Latin *denarius.*

Denis, dē-nē′, or **Dionysius, Saint,** the patron saint of France. The life of this saint is a matter of tradition rather than history. According to the most trustworthy accounts he was sent to preach the gospel in France, then called Gaul, by the pope at Rome, about 250 A. D. He reached Paris after various difficulties and detentions and succeeded in winning many to Christ, becoming the first Bishop of Paris. But the Roman governor of Gaul was disturbed by this success and ordered Denis with several companions to be brought before him. As they refused to give up their faith, they were tortured and at length suffered martyrdom, the date of which event is given variously at 272 A. D. and 290 A. D.

The bodies of the martyrs were thrown into the Seine, but recovered and given burial by a pious woman named Catulla. Later a chapel was built over their tomb, and there in the seventh century King Dagobert I founded the Abbey of St. Denis, which came to be the historic burial place of the kings of France.

Denison, Texas, is situated 72 miles north by east of Dallas. The city is of importance as a railroad center. The Missouri, Kansas & Texas, the Texas & Pacific, the Houston & Texas Central, and the St. Louis & San Francisco railroads maintain extensive shops here. There are also cotton-seed oil mills, flour mills, a creosote works, a handle factory, and a mattress factory, cotton mill and felt factory. It is the seat of St. Xavier's College and has also good public graded schools and a public library. Population, in 1920, 17,065.

Denison, George Taylor (1839-), a Canadian soldier, noted as a writer on military subjects. Born at Toronto, he was educated at Upper Canada College and at Toronto University, and was called to the bar in 1861. Entering the volunteer militia, in 1866 he became lieutenant colonel in the Governor-General's bodyguard, and honorary colonel in 1907. Colonel Denison took an active part in the Fenian raid in 1866, and aided in suppressing the Riel Rebellion in Saskatchewan in 1885. In 1872-73 the Ontario government sent Colonel Denison to England on matters connected with immigration, and in 1877 he was appointed police magistrate of Toronto. In the latter year he won the Russian prize of 5,000 rubles for the best work on the *History of Cavalry.* During 1893-95 Colonel Denison was president of the Imperial Federation League in Canada, and in 1903 was appointed president of the Canadian Royal Society. He early began to write on military history and tactics. His important works are, besides the one mentioned, *Soldiering in Canada, The Struggle for Imperial Unity, Cavalry Charges at Sedan, Canada and Her Relations to the Empire* and a *Munual of Outpost Duties.*

Denmark, a kingdom of northwestern Europe. It lies between the Baltic and the North Sea. It consists of the peninsula of Jutland and several large and many small islands. Of a total area of 24,609 By the terms of the Treaty of Versailles, North Schleswig, which is essentially Danish, was returned to Denmark in 1920, adding 1,469 square miles to the total area. The country of the Danes is low and level. Extensive tracts have been reclaimed from the sea by dykes, as in Holland. The characteristic rock formation is chalk. Extensive sand dunes stretch along the western coast. The government is making energetic efforts to prevent them from creeping inward. Otherwise the country is fertile, producing rye, oats, barley and wheat, flax, hemp, tobacco, and orchard fruits.

Although the shortest day is only six and one-half hours long, the climate is mild in winter and warm in summer, with an abundance of moisture. Green pastures are a feature of the countryside, and are a paradise for cattle. horses, and sheep. The summer is altogether too cool for Indian corn, but vegetables of all sorts grow to perfection. Combined with hay, they

make Denmark one of the finest stock countries in the world. The Danish farms are small, owing to the custom of dividing the father's farm among all the children. Cultivation is carried on with care. Poultry raising is a source of wealth. See article on EGGS.

Danish butter shipped to the London market ranks with the best. Denmark sells London $20,000 worth of garden and dairy products daily. The farmers are a cheery, economical, thrifty, hospitable people. The women still spin and weave. The men make wooden shoes, wooden ladles, platters, and furniture. Old people of good habits and character, if in need, are granted a state pension of from $2.25 to $4.50 a month.

The eastern part of the country contains many royal, that is to say, public forests in which deer, hares, pheasants, and other game still find cover. The many inlets of the sea, winding reedy lagoons, as well as the inland waters, shelter immense numbers of wild waterfowl.

In 1921 the population of Denmark was 3,289,195. The people are almost entirely Danish, related closely to the inhabitants of Norway and Sweden. The government is a constitutional monarchy. King Frederick, son of Christian IX, the elder brother of Queen Alexandra of England and King Georgios of Greece, and also the father of the king of Norway, ascended the throne in 1906. He died in 1912, and was succeeded by his son, Christian X. The body corresponding to our Congress is composed likewise of two houses with the expressive names of the Landsthing and the Folkething. The capital is Copenhagen. The national religion is Lutheran, with complete toleration for all. The flag of Denmark is red with a white cross. It dates from the thirteenth century. It is said to be the oldest flag in Europe.

A complete system of rural schools is supplemented by high schools, normal schools, and a university, the latter at the capital. There is little sheer illiteracy and comparatively little crime.

Outside of beet sugar and liquors, the manufactures of the country are not large. Herring fisheries and oyster beds bring in a large sum annually. The Faroe Islands, Iceland, Greenland, and, in the West Indies, St. Croix, St. Thomas, and St. John formerly belonged to Denmark, but they were sold to the United States in 1917. Outsiders are not allowed to trade with Greenland. The Danish coins are smaller than ours; their measures are larger. The krone, consisting of 100 öre, is worth about twenty-eight cents. The Danish hundredweight or centner equals a trifle over 110 of our pounds. The mile is over 4½ times as long as ours. Kerosene, syrup, vinegar, etc., are sold by the viertal, equal to 1.7 of a gallon.

At one time the Danes were the greatest power in northern Europe. Their kingdom included all Scandinavia, as well as the greater part of the British Islands. Jutland has been the prolific hive of swarms of enterprising marauders who were properly feared by their neighbors to the east and south.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Land area, square miles	16,609
Forest area, square miles	664
Population (1921)	3,289,195
Chief Cities:	
Copenhagen	561,344
Aarhus	65,858
Aalborg	38,102
Horsens	25,149
Odense	45,303
Number of counties	22
Members of Landsting	75
Members of Folketing	149
National revenue	$85,000,000
Bonded indebtedness	$295,000,000
Farm area, acres	1,328,700
Wheat, bushels	5,923,000
Rye, bushels	14,900,000
Oats, bushels	47,500,000
Barley, bushels	24,600,000
Potatoes, bushels	53,087,000
Sugar beets, short tons	176,368
Domestic Animals:	
Horses	597,988
Cattle	2,590,903
Sheep	521,932
Swine	1,429,908
Beet sugar, tons	152,740
Margarine, tons	55,520
Fish caught, value	$9,000,000
Beer, gallons	43,812,000
Brandy, gallons	892,500
Imports	$450,000,000
Exports	$405,000,000
Miles of railway	2,662
Number of schools	4,232

Denominations. See CHRISTIANITY.

Density, in physics, the amount of matter in a body, compared with its size. Judging by the weight, a piece of iron contains seven or eight times as much as a piece of ice of the same size, while cork is about one-fourth as heavy as ice. Water is taken as the standard. A pound of cork and a pound of water weigh the same, and contain the same amount of matter; but a cubic inch of cork contains only about one-fourth as much matter as a cubic inch of water. Scientists have agreed to use a cubic centimeter as the unit of volume and the amount of matter in a cubic centimeter of water as the unit of matter. Under standard conditions a cubic centimeter of water weighs 1 gram, a cubic centimeter of cork weighs .24 grams, and a cubic centimeter of cast iron weighs 7 grams. We say that the density of water is 1; of cork, .24; of iron, 7. By weighing with care, we may build up

A TABLE OF DENSITIES.

Agate	2.615
Alcohol, absolute	0.806
Alcohol, common	0.833
Aluminum	2.670
Antimony, cast	6.720
Ash, dry	0.690
Asphalt	2.500
Beeswax	0.964
Bell metal	8.050
Benzine	0.72 to 0.740
Bismuth, cast	9.822
Boxwood	1.280
Brass, cast	8.400
Brass, sheet	8.440
Brick	1.6 to 2.000
Cedar, American	0.554
Chalk	1.8 to 2.800
Cherry	0.710
Coal, anthracite	1.26 to 1.800
Coal, bituminous	1.270 to 1.423
Copper, cast	8.830
Copper, sheet	8.878
Cork	0.240
Diamond	3.530
Ebony	1.187
Emery	3.900
Ether	0.736
Fir, spruce	0.512
Fluor-spar	3.200
Galena	7.580
German-silver	8.432
Glass, crown	2.520
Glass, flint	3.000 to 3.600
Glass, plate	2.760
Glycerine	1.260
Gold	19.360
Granite	2.650
Graphite	2.500
Gun-metal	8.561
Gypsum, crys.	2.310
Hydrochloric acid, aq. sol.	1.222
Ice.	0.917
Iron, bar	7.788
Iron, cast	7.230
Iron, wrought	7.780
Iron pyrites	5.000
Ivory	1.820
Lead, cast	11.360
Lead, sheet	11.400
Lignum vitae	1.333
Limestone	3.180
Mahogany	0.56 to 0.852
Maple	0.755
Marble	2.720
Mercury	13.596
Nitric acid	1.38 to 1.559
Oak, American red	0.850
Oak, American white	0.779
Oil, turpentine	0.870
Paraffine	0.824 to 0.940
Petroleum	0.836
Phosphorus	1.830
Pine, white, dry	0.554
Platinum wire	21.531
Porcelain, china	2.380
Quartz	2.650
Silver, cast	10.424 to 10.511
Steel, unhammered	7.816
Sulphur, native	2.033
Sulphuric acid	1.840
Tin, cast	7.290
Walnut	0.680
Water, sea	1.027
Zinc, cast	7.000

Dentistry, the art of preserving, repairing, and, in need, of extracting teeth. So far as the history of dentistry can be traced, it appears to have originated among the Hindus or Egyptians. At least the teeth of Egyptian mummies are as old as any in which evidences of dentistry can be found.

The technique of denistry has developed by leaps and bounds in the United States, and among the later triumphs of dentistry several may be mentioned. Instead of confining repairing to plugging cavities, any portion of a tooth is rebuilt to its original shape. During the work rubber cofferdams are placed around a tooth to keep out moisture. Cavities are cleared out with whirling drills driven by means of electricity or by a treadle. An electro magnetic mallet is used to drive gold foil into place with rapid blows. It works on the

same principles of attraction and release as an electric bell.

Readymade porcelain teeth of all sizes and shapes are now turned out in factories to imitate natural teeth very closely. Crown work is a name given to a tooth fastened to sound, natural roots either by metallic dowels and cement, or by the latter reinforced by a gold collar encircling the upper end of the root and the lower end of the crown.

In making a set of false teeth the dentist works from an impression of the gums taken with a plastic material consisting usually of plaster of paris, beeswax, or other similar material.

The recognition of diseased teeth as the source of many bodily—and in extreme cases, mental—ills has resulted in widespread and intensive teaching of oral sanitation. Development of the X-ray as it applies to dentistry has given rise to a body of knowledge regarding the human mouth such as no previous generation possessed. New discoveries have necessarily caused many changes to be made in the technique of dentistry. As an example, many modern dentists recognize the crown as a potential disease breeder, and for that reason usually substitute some other form of repair. Oral sanitation is taught in the schools, the army and the navy, and many minor and major ills are avoided.

Dent, John Charles (1841-1887), a Canadian historian whose works are conspicuously clear and forceful in style and enjoy a wide popularity for their frank analyses of Canadian political history. He was born at Kendal, England. After admittance to the bar in 1865, Mr. Dent practiced for a short time and then returned to England and became an editorial writer on the *Daily Telegraph*. He returned to America in 1867 and did newspaper work in Boston, Mass., and in Toronto, but gave up journalism in order to devote his time to historical work. Mr. Dent's most important works are *The Canadian Portrait Gallery,* a series of biographical and historical sketches; *The Last Forty Years, Canada Since the Union of* 1841, and *The Story of the Upper Canada Rebellion.*

Denver, Colorado, the capital city of the state and commercial metropolis of the Rocky Mountain region, is situated 538 miles west of Omaha, 1,047 miles west of Chicago, and 1,409 miles northeast of Los Angeles, at the junction of the Platte River and Cherry Creek, and on the Atchison, Topeka & Sante Fe; the Chicago, Burlington & Quincy; the Union Pacific, the Denver & Rio Grande Western, the Chicago, Rock Island & Pacific; the Colorado & Southern, the Denver & Salt Lake, and other railroad systems and their branches. Denver is the gateway of the wonderful mountain scenery of Colorado, and for many years it has enjoyed the reputation of being a great tourist and convention city. The altitude is one mile above sea level, and from any elevation a view of the Rocky Mountain foothills and snow-capped peaks can be had for a distance of 200 miles north and south.

The city is the center of a rich agricultural country, watered by irrigation, and is the recognized jobbing center and wholesale market for a large territory. Denver is in close proximity to the great mining region of Colorado, which produces gold, silver, copper and lead. Denver is the center of what is described in the United States Geological Survey as the Denver Coal Basin. The city has an area of 60 square miles and contains about 200 miles of street-railroad track, with a universal transfer system. Interurban lines reach Boulder, Eldorado Springs, Golden and Leyden, passing through the towns of Louisville, Marshall and Superior. Electric service is maintained with nearby popular resorts.

Parks and Boulevards. Denver has 35 parks containing a total of 1,321 acres. City Park is the largest, with an area of 320 acres. It has two lakes, an extensive zoological garden, an aviary, and Museum of Natural History. In the center of one lake is an electric fountain which cost $20,000. The plaza, or civic center, faces the capitol grounds and contains the public library, out-door Greek Theatre, Voorhees Memorial, etc. The city has over 60 miles of boulevards and parkways and about 240 miles of paved, shaded and

graded streets and handsome residences. Many palatial homes surrounded by beautiful lawns are in the Capitol Hill residence district. The Welcome Arch is located at the foot of 17th Street, in front of the Union Station. It was erected by private subscription at a cost of $22,500 and presented to the city in 1906. Adjacent to Denver are Fort Logan, Fitzsimmons Hospital (general army), and the city is headquarters for army and navy recruiting.

PUBLIC BUILDINGS. The most imposing structure of the city is the capitol on the west slope of Capitol Hill. This building is constructed of Colorado granite and cost $2,800,000 exclusive of the site. The grounds are now valued at $1,000,000. The structure is finished inside with bronze and Colorado onyx. A Colorado State Museum has been erected at a cost of $250,000 to house the State Bureau of Agriculture and Horticulture. Also, an additional state office building has recently been completed at a cost of more than $2,000,000. Other noteworthy buildings include the United States Mint, which was opened in 1906; a $750,000 municipal auditorium with seating capacity of 12,000 containing an $80,000 organ on which free concerts are given every noon in summer; a $2,500,000 postoffice building built of Colorado marble; public library property valued at more than $650,000 including a main library on the civic center and eight branch libraries; a city hall and county house; over 240 churches; 330 hotels; 27 theatres; 38 banks and trust companies, and other public buildings.

INSTITUTIONS. The public school system includes 61 elementary schools, most of them with kintergarten departments; six junior high schools, five senior high schools; one evening vocational high school; three elementary evening schools, and one part-time evening and day vocational school, known as the Opportunity School. The following schools are provided for under a bond issue in 1922: Three senior high schools, two junior high schools, nine new elementary schools, and two additions to elementary schools. Among the noteworthy private educational institutions are the University of Denver including, besides the college of liberal arts, schools of law, dentistry, commerce, etc., the Medical School of the University of Colorado, several conservatories of music and academies of art, the Wolcott School for Girls, Regis College, Loretto Acadamy, St. Mary's Academy, Collegiate School for Boys, many parochial schools, and many others; the Presbyterian Hospital, now under construction; the City and County, the Steele, the Emergency, the Mercy, the Park Avenue, St. Joseph's, St. Luke's, St. Anthony's and the Metropolitan hospitals; Adams Memorial, Oaks, North Side, Mount St. Vincent's, and Christian homes; Memorial to the Little Sisters of the Poor (Home for the Aged); The Agnes Memorial, Mt. Airy and Sunlight sanitariums, the National Jewish Hospital for Consumptives, and many others; State Home for Dependent Children and Florence Crittenton Home. Also plans have been completed and the money raised for a $1,900,000 state hospital and medical school in Denver as a part of the University of Colorado, and construction has begun.

INDUSTRIES. Denver is the leading live stock market west of the Missouri River. The Denver Stockyards plant comprises more than 150 acres and contains the largest sheep pen in the United States. A building for the exhibition of live stock is located at the stockyards and cost $250,000. The city has five large meat-packing houses and twelve slaughter houses. Denver has large wholesale industries in dry goods and groceries. The city contains flour and grist mills, car construction and repair shops; the Chicago, Burlington & Quincy Railroad has under construction shops costing $2,500,000. There are also foundries and machine shops and large plants for manufacturing mining machinery.

CHAMBER OF COMMERCE. The Denver Civic and Commercial Association is the leading commercial body of the state. It is composed of representative business and professional men, and has headquarters in its own six-story building in the heart of city.

History. The first settlement was made by a party of gold seekers in 1858 at a place called Auraria. An unsuccessful attempt was made to organize the town of St. Charles on the east side of Cherry Creek, in the territory now embraced by East Denver, in 1858. On November 17, 1859, the town of Denver was incorporated on the site of St. Charles and named after General James W. Denver, governor of the Territory of Kansas, which then included Colorado. Later the town of Auraria became a part of the city and is known as West Denver. The city operates under a charter adopted in 1916 which in effect makes the mayor an elective manager who appoints all administrative officials, and controls the city's finances; and there is an elective council of nine members. The population in 1920 was 256,491.

Depew, Chauncey Mitchell (1834-), an American lawyer and orator. He was born in Peekskill, New York. His education was received at Yale. After practicing his profession of law several years, serving also in the New York legislature, and as secretary of state of New York, Mr. Depew became attorney for the Harlem Railroad Company, beginning a successful career as a railroad lawyer. In twenty years he had attained the position of president of the New York Central and Hudson River Railroad Company, and later was made chairman of the whole Vanderbilt system of railroads. In 1899 he was elected to the United States Senate from New York. Mr. Depew's name, however, is known most widely through his oratorical ability. Especially as an after-dinner speaker he has acquired wide reputation, and great

De Quincey, Thomas (1785-1859), an English essayist. His father, a wealthy Manchester merchant, died in 1792. Thomas was a shy, frail little fellow, fond of books; yet one summer he played the truant from school, put a volume of Greek into his pocket, and acted the vagrant in Wales and in London. At the Manchester Grammar School and at Oxford, he showed a genius for Latin and Greek, being regarded as little less than a prodigy. At fifteen he could converse in Greek fluently, yet he was a staunch advocate of the superiority of English literature. "We engage," he said, "to produce many scores of passages from Chaucer, not exceeding fifty to eighty lines, which contain more of picturesque simplicity, more tenderness, more fidelity to nature, more felicity of sentiment, more animation of narrative, and more truth of character than can be matched in all the *Iliad* or the *Odyssey*."

In 1809 he took possession of a cottage at Grasmere in the Lake District, where he became intimate with the Lake Poets. Here he married. He indulged in the use of laudanum, a habit originally acquired in connection with the rheumatic toothache. Here he read, struggled with his vice, and wrote essays for *The London Magazine* and *Blackwood's* of Edinburgh. His essays fill a dozen thick volumes. Young readers may begin with *Revolt of a Tartar Tribe, The English Mail Coach, Joan of Arc,* and *Confessions of an English Opium Eater.*

For so pleasing and prolific a writer De Quincey has left few sayings, but his whimsical way of writing is well shown in the following extract:

Any man who deals in murder must have very incorrect ways of thinking and truly inaccurate principles. . . . If once a man indulges himself in murder, very soon he comes to think little of robbing; and from robbing he comes next to drinking and Sabbath-breaking, and from that to incivility and procrastination. Once begin upon this downward path, you never know where you are to stop. Many a man has dated his ruin from some murder or other that perhaps he thought little of at the time.

A great master of English composition; a critic of uncommon delicacy; an honest and unflinching investigator of received opinions; a philosophic inquirer, second only to his first and sole hero (Coleridge), De Quincey has left no successor to his rank. The exquisite finish of his style, with the scholastic rigor of his logic, form a combination which centuries may never reproduce, but which every generation should study as one of the marvels of English literature.—*London Quarterly Review.*

His charm, his merit, indeed, is not so much in the novelty of his thoughts as in the dazzling force of his rhetoric, his word-painting, his rhythm, his majestic swells and dying falls, which are to his bare ideas as autumn's gorgeous dyes to the landscape.—Welsh.

Derby, Frederick Arthur Stanley, Sixteenth Earl of (1841-1908), a British statesman generally known as Baron Stanley of Preston. He began his career in the army, but soon entered political life and was elected to the House of Commons at the age of 22. During Disraeli's Ministry (1874-1880), he was in turn Financial Secretary of War, Financial Secretary to the Treasury and Secretary of State for War. From 1885 to 1886 he was Secretary for the Colonies. He was then for two years President of the Board of Trade. From 1888 to 1893, Baron Stanley was Governor-General of Canada, a position which he filled with marked ability and in which he won great popularity. Soon after his return to England he succeeded his brother as Earl of Derby. He was Financial Secretary to the War Office from 1900 to 1903.

Derby, dăr′by, an English shire, town, and noble family. All these are eclipsed by the fame of the Derby horse-race, instituted by the Earl of Derby in 1780. It is held annually on Epsom Downs, an extensive plain near London, on the Wednesday following Trinity Sunday. The races are for three-year-olds. The course is a mile and a half in length. The colts carry a weight, jockey and all, of 126 pounds; the fillies of 121 pounds. It costs $500 to enter. The winner gets $25,000. Lord Rosebery had an ambition to marry the richest wife in England, to become prime minister, and—note the climax—to win a Derby race. He has succeeded in all three. The shortest time on record is that of Kettledrum in 1861. He ran the mile and a half in 2 minutes 43 seconds.

On Derby day London is forsaken. Suburban trains are crowded. Every private vehicle and carriage is out. Superb equipages, with outriders, sweep along the road; a thousand cabs are on the way. Workmen in clean jackets load down the drays. Bootblacks and newsboys, rags and gay ribbons,—afoot, on horseback, or awheel,—all London streams along to see the races. Social distinctions are almost forgotten as duke and newsy go mad in very ecstacy of joy when a favorite wins. The successful jockey is for the time greater than any crowned head of Europe.

See HORSE-RACING.

Derrick. See CRANE.

Dervishes, a class of religious devotees. They are organized usually into an order of mendicant monks, and practice self-denial as holy men. They are found throughout Mohammedan countries and among the Hindu Brahmins. Socially they vary from outcasts, who make a living by practicing sleight-of-hand and begging alms, to men who are held in high esteem for the devoutness of their lives, and who are admitted to the homes of the wealthy. There are two general classes—the howling and the dancing dervishes. The latter dance to the sound of music, working themselves into a state of religious exaltation in which they preach moral sermons. The howling dervishes shout the name of Allah as they dance and work themselves into a pious frenzy not unlike an epileptic fit. They contort their bodies, gash themselves with knives, and go to extremes of self-torture. In a holy war the dervishes take the field and are formidable opponents. In battle they skirmish at the far front, urging their people on with fanatical fury. They throw themselves on the sword or bayonet without the least hesitation, like Arnold of Winkelried, making way through the serried ranks for their frenzied followers. The English and French troops of India, and particularly of North Africa, have found the Arab dervishes a difficult element to deal with.

Descartes, dā-kärt′, **René** (1596-1650), the first of the great modern philosophers, noted also as a mathematician. He was of Hebrew parentage and was born at La Haye, near Tours, France. He showed unusual ability as a student at the Jesuit College of La Fleche where he received his education. He became, however, dissatisfied with the dogmas of scholasticism, which formed a large part of the instruction he had received. After five years residence in Paris he enlisted as a soldier, traveled for some years, especially in France and Italy, and at the age of thirty-three settled in Holland to devote himself to study and writing. That he might ar-

rive at truth he cast aside his books and endeavored to free his mind utterly from the prejudices of education. He was by nature of a mathematical turn of mind and his study of mathematics kept pace with that of philosophy, while his system of philosophy was constructed in accordance with mathematical methods of reasoning. Descartes' system begins with self-consciousness as the basis of all positive knowledge. The oft-quoted phrase *Cogito, ergo sum,* "I think, therefore I exist," expresses the principle which he used as a starting point. From the fact that man can form a concept of a perfect being he reasoned that perfection, as God, must exist. Truths thus known directly he classed as innate ideas. From general truths he deduced individual facts, his method being known as the deductive method of reasoning. Descartes exerted much influence on metaphysical thought. In his *Geometrie* he sought to establish a universal science to include arithmetic, algebra and geometry. His most important works are *Principles of Philosophy,* and *Essays,* which were written in Latin, under the Latinized name of *Renartus Cartesius.*

Deschanel, Paul Eugene Louis (1856-1922), a French statesman and litterateur, President of the French Republic from January to September, 1920, was born at Brussels, where his father was in exile. He removed to France, however, and in 1885 began a brilliant term of service in the Chamber of Deputies. From 1902 to 1910 he was absent from that body, but upon his return he served so well that he was elected president of the Chamber in 1912, serving until 1915. He had already distinguished himself in the literary field and was elected to the Academy in 1899. On January 17, 1920, he was elected President of France; he resigned in September, 1920.

Desdemona, des-de-mō′na, the heroine of Shakespeare's tragedy, *Othello.* She is the daughter of Brabantio, a Venetian senator. Desdemona listens while Othello, the Moor, recounts his many adventures to her father. Her admiration is won; then her love. She weds the Moor against her father's wishes. Othello is led by Iago to believe his wife unfaithful, and in a fit of rage he smothers her. Desdemona's character is well drawn. She is innocent, modest, and ingenuous. Incapable of any base suspicion herself, she is slow to realize that she may be suspected.

Desert, an arid waste. This definition excludes the icy wastes of Greenland and the Antarctic country, as well as the frozen, lifeless tundras of the Arctic coast.

A desert is not a rainless region, for there is no part of the earth's surface without rainfall; but it is a region deficient in rainfall. The Mojave Desert in Arizona has but two inches a year. The coast of Chile near the Pacific has been seven years without rain.

The desert zones of the world are two, one in the southern and one in the northern hemisphere. They lie approximately twenty-five degrees north and south of the equator, in the two belts of wind that blow from the east. In the northern hemisphere the Pacific winds are robbed of their moisture by the mountains of eastern Asia. This, the greatest desert region in the world, begins with the desert of Gobi on the border of China. It stretches westward through Turkestan, Persia, Arabia, and the Sahara of North Africa—a vast arid waste. Part of this desert is the highest plateau land on the face of the globe, and part lies below the level of the sea. It is interrupted by fertile valleys, by local showers from local sources, and especially by the valley of the Nile; but all in all its extreme length is a third of the distance around the globe. It includes an area of between six and seven million square miles. Were it not for the Mediterranean, Southern Europe would be a desert. In the western continent the arid belt begins west of the Mississippi and culminates, if we may so speak of a depression, in the Death Valley of California. In the southern hemisphere, the desert belt is less marked. It includes the interior of Australia, the Kalahari region of South Africa, and the rainless coast of northern Chile.

A large part of the world, formerly regarded as desert, has been reclaimed by irrigation and is now productive. There is no reason why deserts are deserts, save the want of water. They contain stupen-

dous mountain walls and rocky ledges, as well as level plains. The rock elements are present that by disintegration and the decay of vegetable matter have produced the fertile soil of other regions. Possibly the winds that now blow may one day turn windmills that will raise water from the sea to convert millions of barren acres into rich fields and pastures. Leaving out of account semi-arid steppes and plains that produce at least scant pasturage, it is estimated that the deserts of the world cover 4,180,000 square miles of territory.

Among the phenomena of the deserts are vast shifting drifts of sand, often deep enough to bury the highest steeple or the tallest forest. The whirlwinds and the changes of temperature from freezing at night to 150° at noon are to be dreaded.

Deserted Village, The, a poem by Oliver Goldsmith, published in 1770. It is a composition of 430 lines in rhymed couplets, a form of poetry popular at that time. In it the poet first describes the village of Lissoy—the home of his childhood—as he remembers it; then in its present state, reduced to desolation by the usurpation of a wealthy landlord. The poem is simple and musical. It is full of feeling, expressed in graceful and harmonious language. The pictures of the village preacher and the schoolmaster are familiar.

There, where a few torn shrubs the place disclose,
The village preacher's modest mansion rose.
A man he was to all the country dear,
And passing rich with forty pounds a year;
Remote from towns he ran his godly race,
Nor e'er had changed nor wished to change his place;

. . . . . .

There, in his noisy mansion, skilled to rule,
The village master taught his little school;
A man severe he was, and stern to view,
I knew him well, and every truant knew;
Well had the boding tremblers learned to trace
The day's disasters in his morning face;
Full well they laughed with counterfeited glee
At all his jokes, for many a joke had he;
Full well the busy whisper, circling round,
Conveyed the dismal tidings when he frowned;
Yet he was kind, or if severe in aught,
The love he bore to learning was in fault.
The village all declared how much he knew;
'Twas certain he could write, and cipher too;
Lands he could measure, terms and tides presage,
And even the story ran that he could gauge.
In arguing, too, the parson owned his skill,
For e'en though vanquished, he could argue still.

The Deserted Village describes, not a living and active, but a departed and vanished, existence, which the poet has looked upon, loved and prized,—once a rural paradise, a seat of plenty and content; now a decay; a thing of memory, round which fancy and feeling twine their golden, ever lengthening chain. . . . It is a mirror of the author's heart, of the fond pictures of early friends and early life forever sacred. Desolation has settled upon the haunts of his childhood, but imagination peoples the deserted spot anew, rebuilds its ruined haunts, carries us back to the season of natural pastimes, of simple joys in romantic seclusion.—Welsh.

Des Moines, the capital city of Iowa, is situated near the center of the state, on the Des Moines River, and covers an area of 54 square miles. The population of the city in 1920 was 126,468, an increase of 46 per cent in ten years.

Des Moines has many beautiful parks covering 970 acres, and is developing a system of boulevards. Among the public buildings are the State Capitol, the State Historical building, the city hall, the municipal court building, the public library, the post office, the Coliseum, which has a seating capacity of 10,000, the Y. M. C. A and Y. W. C. A.

The 12 special educational institutions include Drake University (non-sectarian), Des Moines University (Baptist), Des Moines Catholic College, Danish Lutheran College and the Still College of Osteopathy. There are 72 public and private schools. There are three high school buildings and two more will be opened in September, 1923. With one exception, Des Moines has the largest percentage of school children to its population of any city in America. The library facilities are unusual and include the Iowa State Library, 169,027 volumes; the Iowa Traveling Library, 48,895 volumes; the Iowa State Historical Library, 24,315 volumes; Drake University Library, 34,794 volumes; Des Moines University Library, 18,851 volumes; the Des Moines Public Library, 140,632 volumes. The public library has five branches open daily and a number of library stations open daily in different parts of the city. There is also a Fine Arts Association with a gallery in the public library, where exhibits are regularly held.

Des Moines has 60 publications, five of which are farm journals with a national circulation. The city is also remarkable as the center of 54 home insurance companies.

Des Moines has become a favorite convention city, as it contains fine auditoriums and hotels that surpass those of many larger cities. The city is the center of a rich agricultural district and has also the advantage of rich coal deposits within the city limits and in the immediate vicinity. The manufactures of the city cover a varied list of articles, including structural iron, engines and boilers, furnaces, clothing, washing machines and patent medicines. The city is an important shipping center, having nine railroads radiating in every direction.

Des Moines was settled in 1843, and was incorporated as a town in 1851, becoming a city and also the state capital in 1857. In 1907 the government was changed to what is known as the Des Moines Plan, this being a modification of the commission form of government.

De Soto, da so′tō, **Ferdinand,** a Spanish soldier and explorer. He was born about 1496. He accompanied Pizarro in his conquest of Peru. Being deceived by reports as to the wealth of Florida, he was eager to explore that country. Charles I made him governor of Cuba and Florida. In 1538 De Soto sailed for Cuba with ten ships, 600 men in armor, and a complement of sailors. Leaving his wife to govern Cuba, he landed at Tampa Bay, Florida, June 10, 1539. He sent most of his ships back to Cuba and started westward with his army in search of gold. He began the march with a number of horses. He brought also a herd of swine, which he purposed to drive along for food in case provisions should become scarce.

The first winter was spent on the banks of the Flint River in Georgia. The command subsisted largely on corn and game obtained from the natives. In the following spring De Soto and his men, burdened with heavy armor, toiled painfully over the Appalachians into the country of the Cherokees. Here they spent several months, wandering up and down the valleys of the Alabama in search of gold. In a battle with the Choctaws a score of his men were killed and two hundred were wounded. One Spanish chronicler of vivid imagination avers that 70 Spaniards and 11,000 Indians fell in the conflict. The second winter was passed on the banks of the Yazoo River among the Chickasaws. In May, 1541, De Soto discovered and crossed the Mississippi River somewhere not far from the present site, it is believed, of Memphis. In the presence of a body of natives, stated at 20,000 although there may not have been more than a dozen, De Soto erected a huge cross made from the trunk of a pine tree, and took possession of the Mississippi in the name of the king of Spain.

Detroit, the metropolis of Michigan and adjacent territory, is situated on the north bank of the Detroit River, from which it takes its name. The word is French, meaning "the strait." The river is about twenty-five miles long. It leads from Lake St. Clair southward to Lake Erie. It widens in places to encircle hundreds of charming islands occupied by villas, vineyards and orchards. At Detroit the passage is about three-fourths of a mile wide and thirty-two feet deep. The current flows smoothly at a rate of two miles an hour. The river affords miles of excellent wharfage and a safe anchorage.

Detroit was settled originally by the French. It passed under British rule at the close of the French and Indian War. The historic defense of the fort in 1763 is graphically told in Parkman's *Conspiracy of Pontiac.* In 1805 Detroit was made the capital of Michigan Territory, then extending to the Mississippi River. The population in 1900 was 285,704. The state census of 1905 reported 317,591. Then census of 1910 gave 465,766; 1920 showed 993,739, making it the fourth city of the United States.

Industry. Detroit leads the world in the production of motor cars, her factories issuing the most cars and the most varied types of cars. Before the age of the automobiles the city was an important center of marine gasoline engine and carriage manufacture, and this in a large part ac-

counts for its development as the center of the automobile industry. Other commodities, some of them of the first importance, produced in Detroit are lumber, paints, staves, chemicals, drugs, leather, adding machines, gasoline tractors, tobacco products, packing house products and ships. During the World War large supplies of ammunition and many torpedo boat destroyers were made here. Detroit is one of the principal centers of the garden seed industry in the United States.

Transportation and Commerce. At Detroit is the most important crossing between the United States and Canada, more freight and passengers crossing the international boundary here than at any other place between the Atlantic and the Pacific. Numerous railroad ferries cross here, and, to relieve traffic somewhat, a tunnel has been constructed by the Michigan Central Railroad to connect Michigan with Ontario. Boats bearing thousands of tons of ore, grain and produce shipped from lake ports west of Detroit pass here, and other boats pass laden with varied merchandise for the West. Detroit is the first city of the northern border in the matter of foreign trade, and stands close to the top of the list of exporting cities of the United States. The largest dry dock on the Great Lakes is located here. Although Detroit does an extensive business over the water routes, it is also an important railroad center, served by the Michigan Central Grand Trunk, Wabash, New York Central, Pennsylvania, Pere Marquette, Canadian Pacific and other roads.

Buildings and Parks. Detroit is one of the most beautiful cities in the United States, and thousands are annually expended for further beautification. In all there are some 1,200 acres laid out in parks, of which Belle Isle, an island with an area of 700 acres, is the largest and probably the best known. Belle Isle is particularly interesting as the site of one of the largest and most complete aquaria and recreation centers in the United States. It is connected with the eastern part of the city by a magnificient bridge. The Grand Circus, a semicircular park in the heart of the city, serves as a center from which radiate some of the most important of the city's streets. Other pleasant spots are Arden Park, the Campus Martius and Palmer Park.

One of the most notable buildings in the city is the Wayne County Courthouse. Other fine structures are the Federal building, the new post office, the Chamber of Commerce, numerous and palatial hotels, and finely appointed office buildings. The most notable churches are Saint Paul's Episcopal Cathedral, the Jewish Temple, The Woodward Avenue Baptist Church, Saint Leo's and Saint Joseph's Catholic churches, the Central Methodist, the Fort Street Presbyterian and the First Congregational.

Educational Institutions. The public school system of Detroit is adequate and is modern to the last detail. Important among institutions of higher learning are the University of Detroit, Detroit College of Law, Detroit Homeopathic College and the College of Medicine and Surgery, which is part of the public school system. Besides a complete and extensive public library system, there is the splendid Museum of Art. See Cadillac, Antoine.

Detroit River, a river, or strait, connecting Lake St. Clair and Lake Erie, and separating the State of Michigan from Ontario, Canada. It flows nearly west to Detroit, where it is about three-fourths of a mile wide, forming an excellent harbor. It has been called the *Dardanelles of the New World.* It is the great waterway, with the St. Clair Lake and River, from Lakes Superior, Michigan and Huron to Lake Erie. It is estimated that more tonnage of shipping passes through this river than through any other stream in the world. The river has numerous picturesque islands, and the scenery along its course is beautiful.

Deucalion, du-kā′lĭ-ŏn, in Greek legend, a king of Phthia, in Thessaly. Deucalion was a descendant of the Titan Prometheus. He was a just man, and his wife Pyrrha was a faithful worshiper of the gods. During the Brazen and Iron Ages man became so impious that Zeus determined to destroy the entire race and start afresh with a new and more worthy type. He

therefore sent a fearful deluge upon the earth, which destroyed all life. The earth became one vast sea, Mount Parnassus alone lifting its summit above the waters. Here Deucalion and Pyrrha, the only beings left alive, found refuge. Zeus, seeing them on the mountain, and remembering their innocence and piety, decided that they might live. He sent the North Wind to scatter the clouds that the sun might again shine upon the earth. Poseidon, likewise, bade his trumpeter take his conch shell and sound the signal for the waves to retreat. When they could leave the mountain, Deucalion and Pyrrha visited a temple, which they found covered with mud and slime, and prayed for counsel. The oracle bade them leave the temple, and "with veiled heads cast behind you the bones of your mother." The couple were astonished. They left the temple revolving this strange reply which commanded them to profane the remains of their parents, an impious act. At last Deucalion solved the riddle. "Earth is the great mother of us all," said he, and forthwith picked up some stones from the hillside and threw them behind him. Pyrrha did the same. Deucalion's stones assumed the form of men; Pyrrha's the form of women,—both retaining so much of the nature of the stones from which they sprang as to be fitted to endure labor and hardship. Thus the world was peopled again, and in time the effects of the deluge disappeared. Deucalion became the father of Hellen, traditionally the ancestor of the Hellenes or ancient Greeks. See MYTHOLOGY; BRAZEN AGE.

Devils Lake, N. D., the county seat of Ramsey Co., is 89 miles west by north of Grand Forks. It is situated on Devils Lake, one of a group of lakes that have no apparent outlet. The water of the lake is too brackish for human consumption. The town is in an extensive wheat growing district, and does a considerable trade in this commodity. It contains a school for the deaf, graded schools, St. Mary's Academy and a Carnegie library. The population was 5,140 in 1920.

Devonian System, in geology, a term for the strata intermediate between the Silurian and Carboniferous. It consists of sandstones of different colors, limestones, calcareous slates, etc., which are divided into three groups, namely, Lower, Middle and Upper. They all contain fossils, including corals, crinoids, brachiopods, mollusks and crustaceans. In the United States, Devonian rocks are found in New York and Pennsylvania, and include sand and limestone, used in building material. They are classed under the names of Oriskany, the oldest term, Corniferous or Upper Helderberg, Hamilton and Chemung. Devonian rocks appear in some regions of the Appalachian Mountains. In the middle part of Michigan they surround the coal basin. They are also found in other parts of the United States, as well as in Eastern Canada and Nova Scotia; and in Central Europe they occupy a large area.

Devonshire, Victor Christian William Cavendish, Ninth Duke of (1868-), a British administrator, Governor-General of Canada from 1916 to 1921. He was carefully educated at Eton and at Trinity College, Cambridge. Entering Parliament in 1891 as a Liberal Unionist for Derbyshire, the Duke served until 1908. During 1900-03 he was treasurer of the royal household, and was later, 1903-05, Financial Secretary of the Treasury. In 1915 the Duke became Civil Lord of the Admiralty, and in the following year was appointed Governor-General of Canada to succeed the Duke of Connaught. In this capacity he displayed administrative ability of a high order. The Duke has extensive estates in England, comprising in all about 190,000 acres; and is also the owner of several picture galleries and a gallery of statuary containing some very rare pieces.

Dew, a quiet deposit of atmospheric water on the surface of the earth. The process of dew making may be seen quite frequently on the surface of a water pitcher. A pitcher of iced water, placed on the table on a hot summer day, is apt to gather moisture from the air. Dew making is closely connected with the theory of saturation. Hot air holds more moisture than cold air. If air has all the water it can

hold, it is said to be saturated. If saturated air be cooled it deposits the water it cannot retain. The point of coolness at which air is unable to retain all its moisture is called the dew point. If the heated air around the ice pitcher be saturated, and the pitcher cools the adjacent air below what is called the dew point, the moisture which the air can no longer hold settles on the surface of the pitcher.

During the summer season the earth cools off after nightfall, and then begins to absorb heat from the layer of saturated air lying next to it. If there be no wind to carry away the cooled air, it precipitates the water which it can no longer hold, and globules collect, not only on the surface of the earth, but especially on blades of grass or other vegetation, which cool much more rapidly than the earth itself. To understand the cooling of the earth, it must be kept in mind that the heat is radiated into space, not absorbed by the atmosphere. Clouds hovering over the earth's surface act like a blanket to catch this radiated heat and throw it back to the earth's surface again. For this reason dew forms chiefly on clear nights. The philosophy of dew making rests on the fact that the earth readily absorbs heat from the atmosphere, but gives it off into space, not into the adjacent air.

See Frost; Rain; Snow.

Dew Point. See Dew; Humidity.

Dewar, Sir James (1842-), a professor of chemistry at the Royal Institution of London. He was born in Scotland, educated there and in England, where he became a professor of natural philosophy at the University of Cambridge, which he left for his present position. He was associated in the invention of cordite, a smokeless powder, but is best known for his research in the realm of low temperatures and liquefaction of gases. In 1886 he succeeded in liquefying and even solidifying oxygen, nitrogen, and air. Fluorine, that previously most elusive element, succumbed to his efforts in 1897, and in 1901 he reduced hydrogen to a liquid and then a solid, thus reaching the lowest temperature ever attained, which, however, was several degrees above the absolute zero

Dewberry, a kind of bramble. Three or four wild dewberries are found in the northeastern, the southern, and the western parts respectively, of the United States. Their general nature is that of the blackberry, which see. The dewberry has of late received attention in gardens on account of its ripening in advance of the blackberry.

Dewey, George, (1837-1917), a noted American naval commander. He was born at Montpelier, Vermont. He took the regular course of training at the Annapolis Naval Academy, graduating with the class of 1858. His first actual experience in naval warfare occurred while serving as a lieutenant in the fleet under Admiral Farragut. He took part in the opening of the lower Mississippi and in other naval operations of the Civil War. In 1870 he received his first command in the warship Narragansett. In 1882 he joined the Asiatic squadron in command of the Juanita. Two years later he was made captain of the Dolphin. He was attached to various boards and bureaus of the navy department. In 1898, just before the outbreak of the Spanish-American War, he was placed in command of the United States squadron in Asiatic waters. April 27, 1898, he set sail from China under orders "to capture or destroy the Spanish squadron," then thought to be in Philippine waters. He entered the channel of Manila Saturday evening, April 30th, and early the next morning he captured or burned the entire Spanish fleet, silenced the land batteries, and took possession of the bay. Nine Americans were wounded; none were killed. On the 18th of August following the city of Manila was taken. In recognition of his decisive victory in Manila Bay Congress promoted Commodore Dewey to the rank of rear-admiral. By act of March 2, 1899, the rank of admiral of the navy was restored for the express purpose of conferring honor on him. He is the third admiral of the American navy. His predecessors were Admirals Farragut and Porter. See Navy.

Dewey, John (1859-), an American psychologist, author, and college professor. Burlington, Vermont was Mr. Dewey's

birthplace and the University of Vermont his alma mater. After a course at Johns Hopkins University he filled successively the positions of professor of psychology at the University of Minnesota, and at the University of Michigan, professor of philosophy at the University of Chicago, and head of the department of philosophy at Columbia University. Mr. Dewey has become widely known as a lecturer and his publications have extended his reputation. These include *Psychology, Psychology of Number, Leibnitz' Essays Concerning the Human Understanding, The Critical Theory of Ethics, My Pedagogical Creed, School and Society, Democracy and Education* and *Reconstruction in Philosophy.*

Dex'trin, a colorless, almost tasteless, gummy substance made from starch by treatment with acids or heat. It is a substitute for gum and may be used for sizing, or in stiffening goods. The name originated from its rotating the plane of polarized light to the right. As the backing of postage stamps and on ordinary envelopes it is familiar to all.

Dhole, dōl. See Dog.

Diadem, dī'ă-dĕm, originally a head band, ribbon, or fillet passing around the head to hold back the hair. The ancients wore diadems of silk, linen, or wool, encircling the forehead and temples, the ends being tied behind, so as to fall on the neck. We may imagine that the diadem was at first a plain band of cloth or leather; but, worn by royalty and rank, it was early adorned with embroideries, gold work, pearls, and precious stones. In later days the diadem has developed into the ducal coronet and crown made of costly metals and adorned with princely magnificence.

Dial, an instrument for measuring exact or solar time by the sun's shadow, is of great antiquity, though it is not known at just what time it was invented. Dials are usually made of metal and are variously placed, the most common manner being to set them on top of a column of stone or wood. A dial is composed of two parts, the plane, or dial face, and the stile, or gnomon. The face of the dial is divided into quarters, the dividing lines running toward the four cardinal points; the face is further graduated into hours, halves and quarters. The gnomon, a flat piece of metal, is set into the center of the dial pointing, in the northern hemisphere, toward the North Pole, and toward the South Pole in the southern hemisphere.

In the common dial, the graduated plate is horizontal, while the stile is parallel with the earth's axis; the horizontal plane makes with the stile an angle equal to the latitude of the place where the dial is set up. This type of dial becomes a polar dial (see below) at the equator, as the plane of the dial is then also parallel with the earth's axis.

A polar dial has a plane parallel with the earth's axis and perpendicular to the meridian; the stile is parallel with the plane of the dial, and the hour lines are straight, parallel lines.

The vertical dial has a plane secured to a vertical wall. The hour lines of this type of dial are similar to those of the horizontal dial.

Diabase, a crystalline rock whose components are lime-soda, feldspar and pyroxene. The feldspar usually occurs in this kind of rock in radial groups of long, flat crystals, and the rock presents a mottled appearance when the pyroxene occurs in large grains. When, as often occurs, the diabase contains olivene, its color is predominantly green; sometimes the pyroxene is displaced by hornblende; and serpentine is often found in the place of olivene and pyroxene. In the Keweenaw Peninsula, Michigan, the copper-bearing rock is diabase; and this rock is also found in the Hanging Hills, Meriden, Connecticut, and in the Palisades of the Hudson. It is found in Scandinavia and in southern India. See Basalt.

Diabetes, a disease characterized by the daily passage of abnormal quantities of urine surcharged with sugar. It is thought that an unhealthy condition of the pancreas, the result, usually, of overeating, is the cause of diabetes; the pancreas fails to function normally, sugar accumulates in large quantities in the blood stream and is eliminated through the kidneys, which are thus called upon to do too much

work. The victim suffers constantly from intense thirst, dryness of throat and lips, and loss of appetite resulting in muscular weakness and emaciation. In its severest form diabetes may be complicated by paralysis, consumption, skin disease and gangrene. Though the disease is hardly curable, proper medical attention and persistent dieting usually insure indefinite prolongation of life. Foods containing starch and sugar, such as pastry, rice, potatoes, carrots, turnips, cauliflower, peaches, pears, apples, plums, oranges, wheat flour, and others must be avoided by the patient; and for these he may substitute fish, green vegetables, meat, butter, eggs, cheese, nuts and bran or gluten bread.

It is always difficult for one suffering with diabetes to keep to a strict diet, owing to some of the articles of food prescribed not being very palatable. This is especially true of gluten bread. To obviate the difficulty, oatmeal may in some cases be substituted. Milk which has been soured by Bulgarian bacillus tablets has been much used, often with decidedly good effect. This is undoubtedly due to the decrease in intestinal fermentation which the milk induces.

It is popularly supposed that diabetes is a derangement of the kidneys, but this is not the case, for there are no changes, such as occur in organic disease of the kidneys.

Diagnosis, the act of recognizing a disease from its symptoms, and the decision which is arrived at. The features which enter into a correct diagnosis of a disease are a study of the symptoms, such as chills, fever, the color of the skin and other marks which the experienced eye of the physician immediately notes. In this is also included an examination of the tongue, throat, chest, abdomen, urine and eyes, which is accomplished by means of the various instruments used in the medical profession.

To become an experienced diagnostician a medical student must go through a prolonged course of study at the bedside of patients, in the laboratories of hospitals, and at autopsies, and by these means follow the various symptoms until recovery or death results.

Di'alect, a language as spoken in some limited region and characterized by local peculiarities which distinguish it from the same language in its literary form, or as spoken in other regions where specific circumstances have given it other peculiarities. When the facilities of travel were few, books scarce, and education confined to a limited class many dialects were spoken. It is said that at one time in England inhabitants of adjoining counties could scarcely understand one another. With the diffusion of knowledge conditions have changed, and while dialects are still common the educated people of any country speak a uniform language. Students of the science of language have found often that supposedly distinct languages are but dialects of some one language, or that forms regarded as dialects are in reality distinct languages. The use of dialect in literature has become quite common in modern times. Especially in fiction dialect is most fitting, for without it scenes and characters often would lose that which, more than all else, gives them life and reality. Many poets have made use of dialect although such poetry can hardly be regarded as of a high type. In spite of the critics, however, dialect poetry like Riley's, for instance, will continue to reach and hold the popular ear.

Diamond, a precious stone. A form in which pure carbon occurs in nature. As a stone it is a crystal, generally without color, but found also in many tints and colors as blue, red, green, black, light yellow, straw, brown, pink, and orange. The diamond is the hardest substance known. It cannot be scratched by anything but a diamond. It cannot be dissolved by any known liquid nor melted under any attainable degree of heat. Any one who can afford to do so can burn a diamond, like a piece of coal, in oxygen. It consumes without ashes, giving off a brilliant light. When heated in a voltaic arc it crumbles into black lead.

Diamond dust is used in the arts to cut and polish gems. The edge of a diamond is used to cut glass, or rather in producing a scratch along which the glass breaks readily. A sharp diamond point is

used in engraving on glass and steel, and, when set in a lathe, for turning glass lenses. Cheap diamonds are used in the diamond drill in making holes for blasting rocks.

As no tool will cut a diamond, the earliest method of dressing diamonds was that of grinding two diamonds together until the desired face had been formed. Under present methods, chips are split off until the stone approaches the desired shape. The faces are then held against a whirling disk of steel fed with oil and diamond dust, and rotated at a rate of 2,000 to 3,000 revolutions per minute. This method of polishing was hit upon shortly before the discovery of America. The chips are saved for many purposes.

Diamonds are cut into various shapes. The table stone is a flat slab-shaped gem with beveled edges. A rose diamond has a flat, circular, or elliptical under surface or base. Its upper surface consists of twelve or more triangular faces or facets, the uppermost of which come together in a point at the center. A third shape, the brilliant, gives the most sparkling effect. It is cut with facets on both the under and the upper surface. The top and back, however, terminate in flat facets instead of points. Counting these two central faces, the upper part of a regular brilliant has thirty-three faces and the lower part, or back, has twenty-five, making fifty-eight in all.

Golconda, India, was long a center of gem cutting. Amsterdam in later times has been the great European diamond cutting center. One Amsterdam establishment claims to cut and polish 400,000 diamonds yearly. America is the great retail diamond market of the world. About $525,000,000 worth, or one-third of the world's diamonds, are owned in the United States. Of late improved methods connected with the introduction of machinery have given American jewelers a claim to superiority in cutting as well. During the year, 1919, $105,273,543 worth of diamonds and other precious stones were imported into the United States.

Diamonds are widely distributed in nature. The most ancient supply source was India, where they are still found; they are found also in South America, Africa, and in the United States in Arkansas, California and Virginia; some have been found in Indiana and Ohio, and occasionally in Wisconsin. The first instance of the occurrence of a diamond in the matrix on the American Continent was at Murfreesboro, Ark., in 1906. Diamonds have also been found in meteorites, one in Russia and one in Arizona, the latter being in the collection of the American Museum of Natural History, New York.

Diamonds occur in the shape of pebbles in beds of gravel, and are found by washing the earth. It is not uncommon for a diamond to explode when reaching the surface, and the larger the diamond the more likely it is to fly into pieces. Large gems are sometimes imbedded in a potato to prevent explosion. Diamonds are weighed by the carat. The standard weight is now the metric carat. The unit is the international carat of 200 milligrams, divided into hundredths in conformity with the decimal system. Until July 1, 1913, there were three different standards in use in the United States, but since that time this metric carat has been sandard in the United Sates and in European countries. In the diamond vocabulary the term "first quality" signifies a stone absolutely white and free from all imperfections.

Many attempts have been made to manufacture artificial diamonds, since the diamond is known to be a crystalline form of common carbon, but with slight results. Moissan, a Frenchman, made 200 experiments at a cost of $2,000, which only yielded one half carat of diamond powder of negligible value.

The Kimberley, or De Beers mines, 600 miles from Cape Town, yield a large supply of diamonds, as does the great Premier Mine in the district of Pretoria, in the Transvaal. The new Jagersfontein mine in the Orange Free State is also a large producer. The Belgian Congo district, Portuguese West Africa, and British Guiana, in South America all supply diamonds, the last named country producing diamonds amounting in 1920 to 18,159 carats.

The famous diamonds of the world have interesting and intriguing histories.

Among them the Kohinoor or Mountain of Light, now among the English crown jewels, weighs (2d cutting) $106\frac{1}{16}$ carats. In 1905, in the Premier Mine, at Johannesburg, South Africa, a huge gem was found, which was named the Cullinan diamond. It weighed, uncut, 3,251 carats. It has been split and now forms two stones: Cullinan I and Cullinan II, weighing $516\frac{1}{2}$ and $309\frac{3}{16}$, respectively. It was presented by the Transvaal Government to King Edward VII. Two other famous diamonds are the Orloff, which formed the point of the royal scepter of Russia. It is a fine rose diamond, weighing $194\frac{3}{4}$ carats. It was found in India, purchased by Prince Orloff and by him presented to Queen Catharine of Russia. The other is the Regent, or Pitt, diamond, weighing $136\frac{3}{4}$ carats, and also found in India. It is now in the Louvre, Paris. Mention must also be made of the Tiffany diamonds, one of which is yellow, the Angleterre, which is blue, the Etoile du Sud and the Grand Duc de Toscane. See CARBON.

Diamond Bird, a small bird that lives on insects, and is related to the honeysuckers. The name comes from the peculiarity of its plumage, which is variegated and very beautiful. The chief color is a dark gray and white, but this is dotted with red, yellow, orange and black, parts of the tail being a dark red. It is of a migratory nature, and chooses its dwelling in the summer among the forests of southern Australia, especially where the honeysuckle and flowering trees abound. It makes its nest in hollow logs, in secluded places on the ground, and in other spots where it believes itself secure from observation. Its call note is loud and sweet.

Wheelwright, in his *Bush Wanderings,* says: "It would be in vain to do justice . . . to the varied and beautiful plumage of this handsome little bird."

Diamond Necklace, The Affair of The, in French history, a celebrated episode at court. The famous necklace was made by the court jeweler, either by order of Louis XV for his mistress, Madame Du Barry, or with the expectation that it would be purchased for her by Louis XV. Louis' death, 1774, and the banishment of Du Barry left the necklace without a purchaser. It was a magnificent ornament, containing about 500 diamonds, and was valued at $400,000. The Prince-Cardinal de Rohan several years later became infatuated with the charms of Queen Marie Antoinette, who, however, was entirely indifferent to him. The cardinal was led to believe, by an adventuress calling herself Countess Jeanne de Lamotte, that the queen looked upon him with some degree of favor. By skillful maneuvering, including the forgeries of the queen's signature, Lamotte, as this woman is usually called, persuaded the cardinal that the queen was anxious to purchase the diamond necklace, and that if he would aid her to do so, she would show him favor. A clever plan was laid by Lamotte to get possession of the necklace. At her suggestion the cardinal purchased the necklace in the queen's name and became responsible for a series of payments. The necklace was conveyed to the cardinal, whence it was taken by a person in the uniform and with the manner of a court valet, who procured it "in the name of the queen." When the day of the first payment arrived, and no money was received, the jeweler went to court and started an investigation. This was the first the queen had heard of the purchase. Lamotte had disappeared, but she was found; and it was discovered that she, her husband, and the "valet" had separated the diamond necklace into sections which they were selling. The imposter, Count Cagliostro, had become involved in the affair also. He had been consulted by the cardinal on account of his professed power to read the future, and had prophesied that the correspondence with the queen would end happily. Doubtless Cagliostro received his share of the profits. All—the tricksters and the tricked—cardinal, Cagliostro, Lamotte, and the "valet"—were arrested and confined in the Bastille. When the matter came to trial, Cagliostro was released, but ordered to leave France. Lamotte was branded with a hot iron on either shoulder, to mark her "thief," and was imprisoned for life. The cardinal was shown to have committed an

act of folly, but nothing worse, and was therefore released.

The saddest part of the whole affair was that the scandal increased popular feeling against the queen, who had been entirely blameless, and, in fact, ignorant of it all. The populace of Paris, in that state of excitement and rage which terminated in the Reign of Terror, could not be convinced of this; and, even at the last, the cursing mob which surrounded the cart that bore the unfortunate Marie Antoinette to the guillotine, cast slurs upon her on account of this diamond necklace affair. The necklace itself had disappeared forever. Alexander Dumas has made use of this story in a novel entitled *The Queen's Necklace.*

Diana, in Roman mythology, the goddess of the moon, of the open air of the country, mountains, and forests. Since her attributes were similar to those of the Greek Artemis, the two were in later times identified. Originally, Artemis was the daughter of Zeus, and twin sister of Apollo. Apollo was the god of day, of light, of music, and of song. He was called Phoebus, the shining one, and, because of her close association with him, his sister was called Phoebe. Apollo came to be identified with Helios, god of the sun; so Artemis was identified with Selene, goddess of the moon. Thus the three distinct characters, Diana of the Romans, and Artemis and Selene of the Greeks, were gradually confounded, although in some respects stories concerning them were contradictory. For instance, Diana—at her own desire, for she had many suitors—remained a virgin, while Selene became the mother of fifty daughters. Finally, in the times of the later mythology, Diana, either on account of her character or her name, became the favorite; and the stories of Artemis or Selene or any goddess associated with the moon, as Luna and Hecate, gathered about her figure, which is most often seen in representations of art.

Diana is to be identified with the witching influence of mellow moonlight. At her own request Zeus permitted her to remain unmarried, and caused thirty cities to celebrate her worship. Diana was devoted to the chase. Accompanied by her nymphs, she delighted in a forest life and in hunting. Agamemnon having unwittingly killed a stag sacred to Diana, she sent a plague upon the camp of the Greeks before Troy. She was appeased only by the sacrifice of the chieftain's daughter, whom she snatched from the altar, however, and bore away, leaving a hind in her place. She became infatuated also with the giant, Orion, whose death was brought about by Apollo through a ruse. She punished Actaeon, the hunter, for surprising her while bathing in a fountain, by changing him into a stag, so that he was torn to pieces by his own hounds.

In art, Diana is represented commonly as a light-footed maiden of the chase, carrying a bow and a quiver full of arrows. One of the most renowned temples of her worship was at Ephesus. Ben Jonson's *Hymn to Diana* is an exquisite poem in which the poet has "seized upon the spirit of ancient song."

> Queen and huntress, chaste and fair,
> Now the sun is laid to sleep,
> Seated in thy silver chair,
> State in wonted manner keep:
> Hesperus entreats thy light,
> Goddess, excellently bright.
>
> Earth, let not thy envious shade
> Dare itself to interpose;
> Cynthia's shining orb was made
> Heaven to clear when day did close:
> Bless us then with wished sight,
> Goddess, excellently bright.
>
> Lay thy bow of pearl apart,
> And thy crystal shining quiver;
> Give unto the flying hart
> Space to breathe, how short soever:
> Thou that mak'st a day of night,
> Goddess, excellently bright.

Diaphragm, dī′ȧ-frăm, a Grecian word meaning a partition wall. In mechanics and anatomy, the term is applied to any thin curtain or partition, as the vibrating diaphragm of a telephone upon which the impulse of the voice falls; the curtain which is used in a photographic camera to cut off the light; and particularly the curtain-like muscle which separates the cavity of the chest from that of the abdomen. The human diaphragm is shaped something like an umbrella, point upward. Its muscular bundles are arranged on the under side somewhat like the rays of an umbrella. When the diaphragm contracts,

that is to say, when these muscles swell and shorten, it is stretched more nearly straight across the body, and, as the point sinks, it enlarges the chest cavity, causing the lungs to inhale air. When the diaphragm is relaxed, its elasticity causes it to assume its natural form, and the center of the diaphragm rises, diminishing the upper or chest cavity, thus driving air out of the lungs.

Diatom, a microscopic aquatic plant whose lively movements are often the cause of its being mistaken for an animal. It is distributed almost universally in salt and fresh water, where it forms the food of numerous low aquatic animals. Diatoms vary greatly in form, but all have hard shells, composed of silica; when the plant dies the shell falls to the bottom of the river, lake or sea. Accumulations of these shells are sometimes of such proportions as to have commercial value.

Dias, Bartholomew (1445-1500), a Portuguese navigator. He was a member of the royal household. In 1486 he obtained command of an expedition sent out to explore the coast of western Africa. Whether by luck or by storm, he lost his way; the two ships rounded the southern extremity of Africa without knowing it, and reached the coast at a point east of the Cape of Good Hope. He explored the eastern coast for about 500 miles and returned *via* the Cape with the great news of an open sea route to India. In 1498 Dias started with Vasco da Gama's fleet, but fell behind to trade on the African coast. He accompanied Da Gama again in 1500. His ship was lost in a storm off the coast of Brazil. See BRAZIL; DA GAMA.

Diaz, dē'äs, **Porfirio** (1830-1915). President of the Republic of Mexico from 1876 to 1911. His mother was an Indian. He was educated in a local "college" and was a student of law when the Mexican War came on. He was practically the government of Mexico from 1876 to 1911. While his government was essentially a despotism, he gave the Mexicans security of life and property and freedom from revolution. He encouraged the investment of American money in Mexican projects. His was a type of "benevolent despotism" that apparently worked to the advantage of the Mexican people.

Following are important events in his career:

1830—Born in Oaxaca, the son of an Indian mother.
1846—Enlisted in the war against the United States.
1854—Took part in the revolt against Santa Anna.
1858—Supported Juarez in war of reform.
1859—Opposed the French in the war of intervention.
1863—Was captured by the French but escaped.
1867—Forced Maximilian to surrender City of Mexico.
1867—Was candidate for president, but defeated by Juarez.
1871—Was proscribed by Lerdo, the successor of Juarez.
1876—Repudiated Lerdo and led revolution to victory.
1876—Was made provisional president in November.
1877—Regularly elected president for three-year term.
1880—Secured election of Gonzales as his successor.
1880-84—Served in cabinet as senator and governor of Oaxaca.
1884—Again elected president and re-elected repeatedly.
1911—Abdicated in the face of a revolution, and sailed June 1 from Vera Cruz for Spain.

Dibdin, Thomas Frognall (1776-1847), a London bibliophile or booklover. He was born at Calcutta and died at Kensington. He was by profession a clergyman. He was noted as a lover of books. One in two volumes, written by himself, he entitled *The Library Companion,* or the young man's guide and old man's comfort in the choice of a library. In 1812 he founded the Roxburghe Club which met to dine and talk over rare books. One rule of the club required each member to reprint some rare work each year for presentation to his fellows. Dibdin's *Bibliomania* is of interest to booklovers. He is a nephew of the Charles Dibdin who wrote numerous naval songs, including *Poor Tom Bowling* and *The Flying Can.* Dibdin will be better remembered by American readers by reason of Field's humorous poem entitled *Dibdin's Ghost.* See FIELD.

Dice (plural of die), small cubes of wood, bone, ivory, or other material, having the six sides marked with dots, one to

six in number. The sum of the spots on any two opposite sides must be 7; as 1 and 6, 2 and 5, 3 and 4. A one spot is called an ace, a two spot a deuce, etc. In playing, from one to five dice are shaken in a cylindrical leather cup, and are thrown out on a table. The sides that lie uppermost are the ones that count. There are various ways of counting the spots. Sometimes the player who throws the highest number of spots is considered the winner. Usually, however, a pair, as two aces, two fours, etc., is considered higher than any number of unmatched spots, while three of a kind is higher than a pair. Three fours are, of course, better than three twos. The throwing of dice is so intimately associated with gambling, and with the petty practice of throwing for cigars or drinks, that it is considered an objectionable parlor game. "The die is cast," is also a proverbial expression, denoting that an irrevocable step has been taken. Games with dice were practiced by the ancient Greeks and Egyptians.

Dickens, Charles, an English novelist. He was born near Portsmouth, February 7, 1812. His father held a very respectable position in the pay department of the British navy, with an income of $1,750, equivalent to $2,500 at the present time. He supported his family in comfort. The childhood of Dickens was happily spent in roaming about the countryside, in romping, playing games, attending school, and reading. He was fond of imaginative reading. Among his favorite books were *The Vicar of Wakefield, Don Quixote, Robinson Crusoe,* and *Arabian Nights*.

When Charles was about ten or twelve years old the Dickens family moved to London. The father appears to have been an easy-going, indulgent man, who spent money faster than he made it. According to an English custom of the time, he was arrested for debt and thrown into prison. Mrs. Dickens attempted to support the family by opening a private school. Employment was found for Charles in a warehouse engaged in the manufacture of shoeblacking. A room was rented for him, and he was allowed his wages to buy his meals or to use as he pleased. This was a sad change in circumstances. Hitherto servants had blacked the shoes of the entire family. Charles would have considered it beneath him to black his own shoes, and now to be engaged in the making of blacking was a grievous humiliation. He never referred to this period of his life without showing bitterness. It appears, however, to have been of great benefit to him. He was thrown on his own resources. He saved money from his lunches to buy comic papers and to attend the theater. He roamed about the book stalls and streets of London, and without becoming in the least depraved, became acquainted with the pickpocket, thieving side of London life, which he afterward made famous in such books as *Oliver Twist* and *Old Curiosity Shop*.

Later, the fortunes of the family mended; the elder Dickens was released from prison and Charles was sent again to school. He entered a law office to prepare himself for the profession, but did not enjoy the work. He learned, instead, shorthand, and began reporting parliamentary debates for the London papers. In this he was so successful that he was sent out at election time to write up the scenes connected with the election of members of Parliament. One step led to another. He soon began writing bright sketches on such subjects as *The Election for Beadle, Greenwich Fair*, and *Seven Dials*. As in the case of Kipling, Thackeray, Fields, and other noted writers, newspaper work led him on into literature. The reception of the sketches mentioned was so encouraging that he wrote next a connected series describing the adventures and observations of an old gentleman and one or two companions, who set out to tour England and see something of the world. These sketches are known as the *Pickwick Papers*. They made Dickens famous and independent.

He bought Gadshill, a piece of property near Rochester, that he had much admired when a boy. He rebuilt the house to suit his own notions, and built himself a sort of eyrie or elevated study up in the tree-tops, where he could be alone and from the windows of which he could see a wide stretch of surrounding country.

He never cared to go far from London, however. He claimed that the rattle and noise of the streets, and the crowds of people gave him the opportunity to select characters and scenes for his novels.

Dickens' works give a wonderful picture of England, especially London life, as he saw it. *David Copperfield* is supposed to give a glimpse of Dickens' boyhood, but it is much too sorrowful. *The Tale of Two Cities* is a story of the French Revolution. *Nicholas Nickleby* acquaints the reader with the country boarding school kept by Mr. Wackford Squeers, the Yorkshire schoolmaster. *Little Dorrit* discusses Marshalsea and imprisonment for debt. *Bleak House* shows how the delays of the law eat up property and ruin clients. *Martin Chuzzlewit* exposes the renowned hypocrite, Mr. Pecksniff, and, incidentally, the questionable methods of Americans in luring settlers to make unprofitable investments in wild lands. *Barnaby Rudge, Dombey and Son,* and *Our Mutual Friend* are good reading.

Dickens was fond of children and very much attached to the Christmas season. As it approached he used to take his children to the toy shops and let them purchase everything they wanted. The Dickens home was turned over to Christmas festivities. For a number of years he made it a practice to write a Christmas story for each holiday season. *The Christmas Carol, The Chimes, The Cricket on the Hearth,* and many others were written in this way.

That Dickens aimed consciously in many of his works to bring about reform in existing institutions and conditions is shown in the prefaces to the early editions. In these attempts he was remarkably successful. Daniel Webster said that Dickens had done more to ameliorate the condition of the English poor than all the statesmen Great Britain had sent into Parliament. He attacked such evils as imprisonment for debt, the poorhouse systems, the management of the court of chancery, capital punishment (prescribed at the beginning of the nineteenth century for more than 160 offenses), above all, the prevailing systems of education. It has been said that "no other writer has attacked so many phases of wrong training, unjust treatment, and ill usage of childhood." His name has been coupled with Froebel's as one of the two most sympathetic friends of childhood.

Dickens visited America twice to give courses of lectures. He wrote a volume of observations, called *American Notes,* that gave offense, but no doubt did Americans good by making them see themselves as others see them. Although his complete works extended to thirty volumes, one who has acquired a taste for Dickens is unwilling to leave a single volume unread. While he has left perhaps few proverbial expressions that pass current, he is remarkable for his description and character sketches. He is a master hand at describing a fire, a runaway, a thief chase, the arrest of a pickpocket, a murder scene, a dinner table, a courtroom, a crowded steamboat, a wharf landing, an old building, a stretch of country, a shrieking railway train. Certainly no one else can make the wind howl through the chimney pots like Dickens.

His characters are genuine creations. Squeers, Pecksniff, Dolly Varden, Micawber, Captain Cuttle, Peggotty, Barkis, Sir Mulberry, Smike, Little Nell, Betsy Trotwood, Uriah Heep, Mr. Gradgrind, Mr. Boffin, Mark Tapley, Barnaby and his raven, Quilp, Pickwick, and Sam Weller are quite as real as Shakespeare's characters.

Dickens died quietly at Gadshill June 9, 1870. He was buried in the Poets' Corner of Westminster Abbey, between the statues of Addison and Campbell.

The following is a list of Dickens' works:

American Notes.
Barnaby Rudge.
Bleak House.
Child's History of England.
Christmas Books.
David Copperfield.
Dombey and Son.
Great Expectations.
Hard Times.
Little Dorrit.
Martin Chuzzlewit.
Nicholas Nickleby.
Old Curiosity Shop.
Oliver Twist.
Our Mutual Friend.

Pickwick Papers.
Sketches by Boz.
Tale of Two Cities.
The Mystery of Edwin Drood.
Uncommercial Traveler.

No one thinks first of Mr. Dickens as a writer. He is at once, through his books, a friend. He belongs among the intimates of every pleasant-tempered and large-hearted person. He is not so much the guest as the inmate of our homes. He keeps holidays with us, he helps us to celebrate Christmas with heartier cheer, he shares at every New Year in our good wishes; for, indeed, it is not in his purely literary character that he has done most for us, it is as a man of the largest humanity, who has simply used literature as the means by which to bring himself into relation with his fellow-men, and to inspire them with something of his own sweetness, kindness, charity, and good-will.—*North American Review,* April, 1868.

Dickens has introduced a reform as to the habit of terrorizing children. Corporal punishment has diminished to one-fourth of its former amount, and Charles Dickens is the prophet to whom the reform owes its potency. . . . Dickens shares with all reformers some of their weaknesses, but he does not share his most excellent qualities with many of them. He stands apart and alone as one of the most potent influences of social reform in the nineteenth century, and therefore deserves to be read and studied by all who have to do with schools and by all parents everywhere in our day and generation.—W. T. Harris.

The chief work of Dickens was to lay bare the injustice, the meanness, and the blighting coercion practised on helpless children not only by "ignorant, sordid, brutal men called schoolmasters," but in a less degree by the best teachers and parents of his time. His was a noble work, and it was well done.—James L. Hughes.

It is as a humorist that Dickens is at his best. There is a whimsical and ludicrous extravagance in his humor, an irresistible ingenuity in the ridiculous, peculiar to him alone. From the time when a delighted people waited in rapturous impatience for the forthcoming number of *Pickwick,* to the publication of the unfinished *Edwin Drood* (1870), nineteenth century England laid aside her weariness and her problems to join in Dickens' overflowing, infectious laughter.—Pancoast.

Dictaphone, an instrument for recording speech and then reproducing it, so that it may be transcribed, as by a typist; a dictating machine. The essential principle of the dictaphone is that of the phonograph in its earlier forms, when wax cylinders were used to receive the record of sound waves for subsequent reproduction. The dictaphone is now in extensive use in business offices, as well as other dictating machines similar in general principles, called by various trade names, as the ediphone, etc. The dictating dictaphone is adapted for use either on a pedestal alongside the dictator's desk, or on the desk itself, without the pedestal. It is operated by a motor through wire connection with an electric circuit. The dictator speaks into a mouthpiece at the end of a flexible tube, his speech being recorded on a wax cylinder, which is slipped on to a mandrel in the machine. It utilizes a single diaphragm, with a simple lever adjustment that enables the dictator to dictate at will, and to "listen back" whenever he desires to hear what he has dictated. Lifting the speaking tube from its hook starts the motor; placing it back on the hook stops it. Back spacing and forward spacing are automatic. When one wax cylinder is filled with dictated matter it is slipped off the mandrel and replaced by another.

The transcribing dictaphone is specially designed to be used alongside the typewriter. A pneumatic button device, known as the foot-trip, controls the starting and stopping of the motor. A set of hearing tubes is provided, and by placing these in her ears the operator is able to hear every word of the dictation as she transcribes it on her typewriter. The volume of sound is controlled by a modifying device, and the speed of reproduction is regulated by a small knurled wheel convenient to the operator's hand. By pressing the back spacer, any word or phrase that is not distinctly heard the first time may be repeated as often as necessary.

Dictaphone cylinders are utilized over and over again by means of a shaving machine which forms part of the standard dictaphone outfit. This machine is built like a lathe, but is much simpler. It also operates by electric motor. The used cylinder is placed on a mandrel, and a sapphire knife is adjusted against its surface. This knife travels the length of the cylinder surface and cuts off a thin shaving, leaving the surface ready to record the sound waves of new dictation. Each dictaphone cylinder may be shaved in this

way about one hundred times before becoming too thin for use.

Dictionary, a book containing a list of the principal words of the language, with their definitions and pronunciations. Some dictionaries give not only the present meaning of the words but the source from which each word came, with its successive changes and meanings. The pronunciation is determined by the usage of the best speakers, although there is disagreement about some words. In such a case both of the pronunciations are given with the preferred one first. The arrangement of words is alphabetical in all common dictionaries. Small pocket dictionaries are made containing none of the inflections and with only the common words given. The oldest dictionary known consists of clay tablets found in the library of Nineveh. Their date is about 650 B. C. The cuneiform inscriptions of the Babylonians are placed in vertical lines, each followed by explanations in the same kind of character. Several Greek lexicons are known to have been written. A dictionary of the words used by Homer, prepared at the University of Alexandria, is one of the oldest that has been preserved. A number of English dictionaries, the oldest dating from 1616, were succeeded in 1755 by Dr. Samuel Johnson's famous dictionary of the English language. Other dictionaries still referred to are those of Perry, Sheridan, Walker, and Smart. The earliest American dictionary maker was Noah Webster. His first edition appeared in 1806. His *American Dictionary,* the first large American work, was published in 1828. It was the forerunner of the *International* of 1890. Other American dictionaries are the *Worcester,* the *Standard,* and the *Century.* The *Century* is a revision of the large English work of Ogilvie. The *New English Dictionary,* which was begun in 1884 and completed in 1915, was published at Oxford University and is also known as the "Oxford" dictionary. It includes every word in English literature, with a complete history of each. Under the letter "B," for instance, there are 17,729 words. This dictionary contains 6,000,000 quotations.

The enormous increase both in the number of words in our language and in lexicographic methods is shown from the fact that Dr. Johnson's dictionary defined 60,000 words, while the *New Standard* (Funk & Wagnalls) defines 450,000, not including 65,000 proper names, 32,000 quotations, and many other valuable and interesting features. *The International Dictionary* defines about 400,000 words and phrases, and the *Century* about 300,000 words.

Among foreign dictionaries the *La Rousse* is one of the great dictionaries of the world, and is very comprehensive. There are numerous dictionaries of a special nature, such as medical, legal, engineering, chemistry. Among these latter may be mentioned *Harper's Dictionary of Classical Literature, Bouvier's Law Dictionary, Quain's Dictionary of Medicine, Grove's Dictionary of Music, Watts' Dictionary of Chemistry, Bryan's Dictionary of Painters, Tolhausen's Technological Dictionary,* etc.

Dictograph, an instrument embodying the principle of the telephone, used for various purposes, such as overhearing conversations in another room or at a distance, magnifying the sound of the human voice, etc. In detective work the dictograph has proved useful for listening unseen to incriminating conversations and recording them; and the results obtained through this use of the device have figured in many criminal trials since 1912, when it was first adopted. The apparatus for this purpose consists of an ordinary telephone circuit, with a sensitive granular carbon transmitter having a diaphragm somewhat larger than is usually employed, so as to increase the reproduction of sound at the receiving end of the line. Such a transmitter, inconspicuous in itself, may be placed in a room where suspected persons are expected to meet, with wires leading to a recording station in an adjoining room or some other convenient place, and their conversation, heard over the wires, can be taken down by a stenographer. Another use of the dictograph, or a device similar to it, is in the reproduction of a speaker's voice at different parts of a large auditorium; also in railroad waiting rooms, to

announce the arrival and departure of trains.

Diderot, Denis, de-nē dē-drō′ (1713-1784), a French philosopher and writer. He was born at Langres. His father gave him a classical education, designing him for the church. The young man disliked this calling, however, and was no better pleased with the law, which he tried for a short time. His father was so displeased with him that he refused further aid. Young Diderot had a hard time for many years. He married at the age of thirty, increasing his cares, with no increase in income. About the same time he began to turn his attention to literature. He wrote philosophical essays, made translations, and wrote dramas. The latter were entirely unsuccessful. Diderot's really important work was the *Encyclopedie,* regarded as one of the principal works of the age in France. He and D'Alembert were joint editors. Diderot wrote the articles on historical subjects, on ancient philosophy, and on the mechanical arts and industries. He revised all articles. He was fitted both by natural gifts and by education for this work, which occupied him for thirty years. Diderot was a somewhat fanatical atheist. He was desirous of converting his countrymen to his views. He propagated his ideas to some extent through his encyclopedia. *Rameau's Nephew* and *The Nun* are two of Diderot's stories. They give effective pictures of the corrupt society of the time.

Dido, dī-dō, in classical legend, the queen of Carthage. She may have been a historical character, but the stories told of her are essentially inconsistent. According to the common legend she was sister of Pygmalion, king of Tyre. Her brother slew her husband for his wealth. But Dido, taking the treasure for which her husband had been murdered, and which her brother had failed to find, set sail for Africa, accompanied by many faithful followers. In Africa, Dido bargained for as much land as a bull's hide would cover, but cut the hide into the narrowest strips and claimed as much land as these strips could be made to surround. Here she built the citadel of Byrsa, around which the city of Carthage grew up. About to be forced into a marriage with Hiarbas, the Numidian king, Dido caused a funeral pile to be erected upon which she stabbed herself. From that time, she was worshiped as patroness of the city of Carthage.

Virgil, in the fourth book of the *Aeneid,* tells a different story of Dido's death. He represents Aeneas as landing on the African coast. Dido receives him in most friendly fashion. He is her guest for some months, and seems content to remain, since both a kingdom and a bride are offered him. He is destined, however, for a different fate. Jupiter sends Mercury to bid him resume his journey. Aeneas obeys. Dido is broken-hearted and seeks death as the only solace for her unrequited love. Virgil has handled this romantic story in so masterly a fashion that it has become one of the most famous stories in all literature. For the character of Dido, Virgil was indebted doubtless to Cleopatra, Queen of Egypt. The incidents connected with her life and death were fresh in all minds at the time this part of the *Aeneid* was written, and had doubtless made a deep impression. In the sixth book of the *Aeneid,* Aeneas visits the infernal regions, and there beholds the "unhappy Dido." He weeps at her sad fate, calls the gods to witness that he did not voluntarily desert her, and begs a farewell word. But Dido passes on, insensible alike to his tears and his pleading.

Many of the ancient critics believed Virgil to have committed an anachronism in representing Aeneas and Dido as contemporary. Dido's founding of Carthage was placed from fifty to one hundred years earlier than the founding of Rome. That Dido is called Elissa by Virgil and others, is due doubtless to a confusion of two distinct personages. The name Dido was in reality the surname of the Phoenician Astarte, goddess of the moon, who was also goddess of the citadel of Carthage. Elissa or Elisa was the Tyrian foundress of Troy. She was confounded with the goddess Dido and came to be called Dido. The story of Dido has been told by Chaucer in his *Legend of Good Women* and by Tasso in *Jerusalem Delivered.* Both of these authors have followed Virgil closely. One of Marlowe's tragedies is *Dido, Queen of Carthage. Dido Building Carthage* is

the subject of a famous painting by Turner, now in the National gallery at London.

See AENEID; VIRGIL.

Diedrich Knickerbocker, the name over which Washington Irving wrote *Knickerbocker's History of New York,* published in 1809. See IRVING, WASHINGTON.

Dies Irae, dī′ēz ī′rē, or day of wrath, an impressive Latin hymn sung at funeral exercises or at requiem mass. It was written by a Franciscan monk about 1250; at least it appeared at Venice at about that date. The first two stanzas are as follows:

Dies irae, dies illa
Solvet saeclum in favilla,
Teste David cum Sibylla.

Quantus tremor est futurus,
Quando Judex est venturus,
Cuncta stricte discussurus!

The entire hymn consists of seventeen three-line stanzas and a final stanza of four lines. Its effect, when sung by a choir beneath the vaulted roof of a cathedral to the rich accompaniment of an organ, is said to be peculiarly solemn and thrilling. Numerous translations have been made—one by General John A. Dix.

Diet. See FOOD.

Diet, a national assembly. The word is considered a derivation of the Latin *dies,* a day, having reference to a legislative assembly called to meet on a fixed day. Diet, therefore, is a general term like congress, parliament, convention, legislature.

The most noted diet was the great council of lords called by the emperor of Germany. The various sessions were known by the city in which they were held. The Diets of Worms were held in 1495 and 1521. The latter diet was the one, it may be remembered, before which Luther was summoned. The Diet of Augsburg met in 1530. The imperial diets consisted originally of nobles, but, during the fourteenth century, representatives of the free cities were admitted. The diets named above sat in three colleges: (1) the electoral princes; (2) the princes, temporal and spiritual; and (3) representatives from the imperial cities. The colleges deliberated separately. An agreement of all three was necessary before a measure might be presented to the emperor for his approval.

The term is now little used. The diet of Switzerland, established in 1803 by Napoleon was superseded in 1848 by the Federal Assembly, consisting of two houses, the Council of the States and the National Council. The Diet of Denmark, consisting of two houses, the Landsthing, or upper house, and the Folkething, or lower house, is known more frequently as the Rigsdag. The Diet of Sweden consisted formerly of four chambers or estates,—nobles, clergy, citizens, and peasants. In 1866 this diet was replaced by a modern parliament, still known, however, as the Diet. The Diet of Norway is known as the Storthing. The Diet of the modern German Empire consisted of the Bundesrath and the Reichstag. No one word includes both houses.

Dietectics. See FOOD.

Diffraction, a term used in physics to denote the spreading out of light waves after passing an obstacle or after going through a small opening. As a result of the interference of the secondary wavelets, fringes of color appear. Should you put India ink on a plate of glass, draw on it with a sharp needle a series of parallel lines as close together as possible, you would see several bands of prismatic colors. Glass plates scratched with fine lines, many thousands to the inch, called diffraction gratings, are used in producing the best spectra. Viewing the light as reflected from their surfaces rather than transmitted, gives the same result. The iridescent colors from pearl or a peacock's feathers are a phenomenon of diffraction.

Diffusion, the slow mixing of two substances when brought into contact. It is most noticeable in gases and liquids though intermixture, to some extent, takes place in solids. If a vessel containing hydrogen is placed mouth downward over one filled with chlorine thirty-five times as heavy, they will mix until uniform in composition throughout. A little heavy sulphuric acid at the bottom of a vessel of water will slowly distribute itself all through the water. Blocks of lead and gold in contact will diffuse slightly. Diffusion is explained from the kinetic theory of matter, though the question of adhesion determines whether certain substances will mix or not.

Digestion. See ALIMENTARY CANAL; FOOD.

Digger Indians, a name given to several western tribes of Indians, chiefly Shoshonean, extending from Idaho to California. The name was applied in particular to the Bannocks and Piutes. As contrasted with Indians of the chase and Indians of agricultural habits, the Diggers live largely by digging and eating roots. The camass root in particular was a source of food. Pine nuts, lizards, almost any vegetable or animal food, seem to be acceptable to the Diggers.

Among all these Indians the most miserable are the root-diggers, who live almost entirely on the scanty roots of plants which are found in the ravines or plains. These poor wretches suffer all the hardships of hunger and want. They are compelled to spend two-thirds of the year among the mountains, with no other resource than a little fish and roots. When both these provisions fail, it is impossible to picture the wretched state of these pariahs of the wilderness. Yet they are not downcast; they are ever cheerful, and endure their suffering with dignity. They are open and sociable with strangers and perfectly honest in their transactions.—Abbe Domenect.

Among the choice delicacies with which the California Digger Indians regale themselves during the summer season is the grasshopper roast. Having been an eye-witness to the preparation and discussion of one of their feasts of grasshoppers, we can describe it truthfully. There are districts of California, as well as portions of the plains between the Sierra Nevada and the Rocky Mountains, that literally swarm with grasshoppers, and in such astonishing numbers that a man cannot put his foot to the ground, while walking there, without crushing great numbers.

To the Indian they are a great delicacy, and are caught and cooked in the following manner: A piece of ground is sought where they most abound, in the center of which an excavation is made, large and deep enough to prevent the insect from hopping out when once in. The entire party of Diggers, old and young, male and female, then surround as much of the adjoining grounds as they can, and each, with a green bough in hand, whipping and thrashing on every side, gradually approach the center, driving the insects before them in countless multitudes, till at last all, or nearly all, are secured in the pit.

In the meantime smaller excavations are made, answering the purpose of ovens, in which fires are kindled and kept up till the surrounding earth, for a short distance, becomes sufficiently heated, together with a flat stone, large enough to cover the oven. The grasshoppers are now taken in coarse bags and, after being thoroughly soaked in salt water for a few moments, are emptied into the oven and closed in. Ten or fifteen minutes suffice to roast them, when they are taken out and eaten without further preparation, and with much apparent relish, or, as is sometimes the case, reduced to powder and made into soup. And having from curiosity tasted, not of the soup, but of the roast, really, if one could divest himself of the idea of eating an insect as we do an oyster or shrimp, without other preparation than simply roasting, they would not be considered very bad eating, even by more refined epicures than the Digger Indians.—*Birds and Nature.*

Digitalis. See FOX GLOVE.

Dilemma, in logic, a choice between two unwelcome conclusions. The two conclusions are called the horns of the dilemma. The following illustration, borrowed from Chambers, will perhaps convey a clearer idea than any definition. "If this man were wise, he would not speak irreverently of Scripture in jest; and if he were good, he would not do so in earnest; but he does it, either in jest or earnest; therefore, he is either not wise, or not good." The term is applied also, but less correctly, to a state of affairs in which one is uncertain which of two courses to pursue. A politician, for instance, who fears to vote for high license lest he offend the saloon element, and who fears to vote against high license lest he lose the support of the anti-saloon element, is said to be in a dilemma. Whichever way he turns he is likely to be gored. See SCYLLA AND CHARYBDIS.

Dill, a common garden plant of the carrot family. Dill is a native of Spain, but is widely diffused throughout regions having temperate climates. It is an aromatic herb akin to caraway. The seed is much used in Germany to season pickles, and in England to impart a flavor to gin. It has also a medicinal value somewhat like that of peppermint, especially in case of colic.

Dillon, John (1851-), a noted Irish Nationalist politician, a member of Parliament for Tipperary from 1880 to 1883, and for East Mayo from 1885 to 1918. He was born in New York City. Early identifying himself with the Parnellites, Mr. Dillon after becoming a member of Parliament soon became known for the violence of his language. He was suspended from the House of Commons under three successive speakers, and was imprisoned by a Liberal and a Conservative government because of speeches delivered in Ireland.

His first imprisonment occurred in 1881; his second in 1888. He became known to his friends as "Honest John Dillon," and was one of the most prominent promoters of the well known "Plan of Campaign." Mr. Dillon was active in the promotion of the Land League, the National League, the "No Rent" manifesto, and of the United Irish League. In 1896-98 he was chairman of the McCarthy section of the Irish party.

Dillon, John Irving (1873-), an American editor and political writer, was born at Wilkes-Barre, Pennsylvania, and educated at the Ringley Polytechnic Academy, Philadelphia. Mr. Dillon, beginning his career as a news writer soon after leaving school, rose to the position of editor of *Society* in 1895; and thereafter edited several periodicals, conducted the "Lines and Rhymes" column of the Philadelphia *Evening Star*, and edited the *Evening Call Magazine*. During this time he earned a considerable reputation as a special correspondent and as a writer on current political topics.

Dime, a United States silver coin, being equivalent to ten cents, or one-tenth of a dollar. The term is a contraction of the French *dixième*, meaning the tenth. The first American dime was coined in 1796. The dime has been in continuous circulation, except when displaced by paper money, ever since. Though of less value, the American dime corresponds to the English sixpence. "Take care of the dimes, and the dollars will take care of themselves," is a thrifty American proverb. A well worn couplet runs:

> Dimes and dollars, dollars and dimes,
> An empty pocket is the worst of crimes.

Diminutive, in grammar, a word derived from another to express a little thing of the same kind. The diminutive is formed usually by the addition of a syllable, called a diminutive-ending, as et, ette, let, kin, ling, ock, in, ie, ille, ule, etc. Thus we have:

Babykin, a young baby
Rivulet, a small river.
Peterkin, little Peter.
Floret, a tiny flower.
Storiette, a short story.
Molecule, a small mole or mass.
Hillock, a low hill.
Duckling, a young duck.

Dimity, a sheer, fine cotton dress fabric, characterized by tiny raised cords running warpwise of the web. Dimity is usually finished white, but both colored and printed dimities are on the market. The name is supposed to have been derived from Greek words signifying two-threaded, and to have been applied to stuffs showing two warp threads or cords thrown into relief on the surface of the goods. The original materials were silk and wool. At present, the name is used exclusively for cotton fabrics. A heavy, corded cotton fabric dyed in plain colors and printed, used for furniture covering, drapery, etc., is likewise called dimity.

Dingo (native Australian name), the wild dog of Australia, remarkable for being the only species of dog existing both wild and domesticated. The dingo is about two and a half feet in length and less than two feet high. Its color varies from brown to black, but it is usually tawny. It does not bark, but at night howls like a wolf. These dogs are very fierce when wild and are very destructive to small domestic animals. Domesticated, they are affectionate and faithful, and are used by the natives in hunting rats, snakes, lizards and opossums.

Dinornis, dī-nŏr′nĭs, a gigantic bird of the ostrich kind. The term is Greek, meaning terrible bird. Our descriptions are based on the skeletons found in the swamps of New Zealand or buried in sand on the seashore. The species is thought to have become extinct in the eighteenth century. The largest of these birds stood from ten to fourteen feet high. They were incapable of flight. The bones are strong and solid like those of a quadruped. The thigh bones were stouter than those of a horse. It had three toes. From a single bone brought home by a scientific expedition Professor Owen of England made a drawing of this bird so successfully that subsequent finds have not made it necessary to change his description materially. A very fair skeleton is preserved in the

DIOGENES
From the Painting by J. L. Gerome

Museum of Natural History in New York Central Park. See OSTRICH.

Dinosauria, a sub-order of fossil reptiles established by Herman von Meyer in 1832, and subsequently called by him *Pachypodes*, or *Pachypoda.* In 1841 Professor Owen gave them the name which they still retain, Dinosauria. Huxley placed them as one of two sub-orders under his order *Ornithoscelida.*

In habits the dinosaurs were terrestrial and often amphibious. Some had a graceful, bird-like action, while others were clumsy and heavy. They varied greatly in size, some having a length up to 70 feet and a weight estimated at from 20 to 25 tons, while the smallest were the size of a chicken.

Dinwiddie, Robert (1690-1770), a Colonial Governor of Virginia who, immediately after establishment in office in 1752, began making plans for the French and Indian War, already impending, and thereby precipitated that conflict. Governor Dinwiddie was born in Scotland and was for a time surveyor of customs for the Colonies. In 1753 he sent George Washington to demand the withdrawal of French soldiers and traders from territory in western Pennsylvania then claimed by Virginia. During the ensuing war he aided the expedition sent against forts Duquesne, Niagara, Frontenac and Crown Point. Because of reluctance to vote funds for the prosecution of the war, the Colonial Legislature roused Governor Dinwiddie's ire, and there was continual conflict. He was recalled in 1758.

Diocese, dī′ō-sēs, the district and people falling under the care of a bishop. The term is a political one. It was borrowed from the Romans by the early Christian church. In the day of Constantine the empire was divided into thirteen political dioceses, each comprising several provinces. Thus Italy was a single diocese. The ecclesiastical diocese is a smaller division. The diocese of John Carroll of Baltimore, the first American bishop, appointed in 1790, included the thirteen American colonies.

Diocletian (Gaius Aurelius Valerius Diocletianus), (284-305? A. D.), a Roman Emperor. He was of humble birth, and a native of Dalmatia. When a young man he entered upon a military career and served with distinction. When Numerianus was murdered Diocletian was proclaimed Emperor of Rome (284 A. D.) by the army, but was compelled to share the government with M. Valerius Maximian. In 292 C. Galerius and Constantius Chlorus were also raised to a share in the Empire, which was thus divided into four parts, of which Diocletian administered Thrace, Egypt, Syria and Asia. As a result of his reign the Roman power was restored, and the barbarians were driven back from all the frontiers. Diocletian reformed the coinage and attempted to regulate the prices of food and other necessities and to increase trade. In 305 Diocletian and Maximian resigned.

Diogenes, dī-oj′ē-nēs (412-323 B. C.), a Greek philosopher. He was a native of Sinope, Asia Minor. He traveled to Athens and became a cynic. He and his father were accused of tampering with gold coins and were expelled from the city. Of all his belongings, he kept only his cloak, purse, and a wooden bowl, declaring that the more a man had, the greater were his wants. Seeing a boy drink from the hollow of his hand, he even threw away his bowl. He lived in an empty cask, still spoken of as Diogenes' tub. As this circumstance is spoken of by satirists, rather than by historians, it is regarded sometimes as untrue. On one occasion Diogenes was seen walking through the streets of Athens with a lantern in broad daylight. On being asked what he was looking for, he replied, "I am seeking an honest man." On one occasion Alexander the Great is said to have asked Diogenes what he could do for him. Diogenes replied that the only favor he could grant was not to stand between him and the sun. Alexander was so impressed with the cynic's content that he exclaimed, "If I were not Alexander, I would be Diogenes." A story runs to the effect that, Plato having defined man to be a two-legged animal without feathers, Diogenes plucked a cock, and bringing him into the school, said, "Here is Plato's man."

Whereupon Plato deemed it well to add to his definition the words, "with broad, flat nails."

Dionysius, dī-o-nish′ĭ-us (431 or 430-367 B. C.), the tyrant of Syracuse. Originally a clerk, he succeeded in having himself appointed to a military command, which he managed in such a way as to make himself absolute master of the city. He was a ruler of ability, maintaining himself against the Carthaginians with skill. He made Syracuse an important commercial factor in the Mediterranean Sea and subdued his neighbors on the adjacent coasts of Italy. He aimed also to attract attention in the Olympian games, and contended several times for the prize for tragedy at Athens, winning third and even second, but never first place. He is remembered for the construction of a state prison in the form of a whispering gallery. It was known as the Ear of Dionysius. By placing himself at the end of a tube leading from the cell, he was able to overhear the slightest whispers of his prisoners as they conversed. In this way, he sought to keep himself informed of the plots and stratagems that surround a king, especially one who has seized authority by force of arms. Among the whims of this monarch was a stand carrying as many lamps as there are days in the year. See DAMON AND PYTHIAS; DAMOCLES; SYRACUSE.

Dioscuri. See CASTOR AND POLLUX.

Diphtheria, dĭf-thē′rĭ-a (Greek, meaning leather), an infectious disease. Diphtheria is a bacterial growth on the mucous membrane of the throat and elsewhere. It spreads somewhat like a mold over the surface, forming a false, furry membrane, whence the name. The bacterium or microscopic plant which produces the disease is called the bacillus of diphtheria. A person, particularly a child, with a sore throat, is most likely to catch the disease; but it proceeds invariably from one who already has it. The germs of diphtheria lie in one's system from two to seven days before they breed in sufficient numbers to attract attention. Care should be taken lest patients with diphtheria communicate the bacillus to others. Ordinary breathing does not dislodge the germs, but a cough is likely to send them out in a fine spray. The patient should be kept apart from other members of the family; clothing should be burned, and all other articles should be thoroughly cleaned with a disinfectant. Lest germs be imbibed, physicians object to having school children drink from the same cup, or wipe on the same towel. The bacillus of diphtheria does less damage itself than is done by a poisonous principle it makes, called diphtheritic toxin. Scientists have succeeded in discovering a remedy which, injected into the veins of the patient, neutralizes this toxin, and is called therefore antitoxin. Treatment with the antitoxin not only destroys diphtheria, but renders a patient proof against its recurrence for some time. Having had the disease once is no guarantee, however, that it will not renew its attacks

Within the last few years the Schick test to determine which children are likely to develop diphtheria after exposure is considered an advance in preventing the disease. In the report of the committee appointed by the New York City Health Office on the Schick test there were over 300 children who had originally given a negative Schick test, and were therefore naturally immune. These cases were under observation for several years and in but five did the reaction become positive. The vaccination treatment was well borne by young children. The disease has the greatest menace between the ages of 2 and 6 years. However, the Schick test is not infallible. In some hospitals no attention is paid to the test, and immunization is universal. There is a movement under way in some of the schools to introduce wholesale vaccination by school physicians, with the permission of parents who have first had a course of instruction through leaflets, lectures, etc. Physicians are not agreed as to the immunization of children who are presumably insusceptible to the disease. See DISEASE.

Diplomatic Service, that branch of government service which guards the interests, other than commercial, of a government in its relations with other governments. For centuries the European nations quarreled among themselves about the

place the representative of each country should take at a foreign court, each nation demanding precedence of the others. At last a congress at Geneva in 1815 and one at Aix-la-Chapelle in 1818 divided these representatives into four grades of rank; these are given below. Today all countries sending representatives of the same class, say ambassadors, have equal rank, and their ambassadors take their places at social affairs, audiences with the sovereign, processions, and the like, in the alphabetical order of the countries they represent.

1. In the highest group are ambassadors ordinary, extraordinary, and plenipotentiary. The duties and privileges of ambassadors are treated fully in an article under that head. Such a representative is ambassador ordinary if he resides permanently at a foreign court, and extraordinary if sent on a special occasion. The word plenipotentiary means having full power. An ambassador plenipotentiary, then, is an ambassador extraordinary whose letters to the foreign court give him full power to conclude his special business, whether it be to negotiate a treaty, conclude peace, or what not.

2. The group second in rank includes envoys extraordinary and ministers plenipotentiary, and special commissioners. An envoy extraordinary and minister plenipotentiary is usually, strange to say, a permanent resident, as the representative of his government in a country less important than one to which is sent an ambassador. A special commissioner is a person sent on particular business but lower in rank than an ambassador extraordinary.

3. The position of minister resident is still less important. The United States sends such representatives only to the small countries of Liberia and the Dominican Republic.

4. A chargé d'affaires is a man, usually the secretary of the legation, left in charge of a legation in the absence of a higher representative.

This classification has been adopted by the United States only since 1893, and all members of the service are often spoken of still as "ministers," so that there is much confusion in the use of the term. The question as to what rank of representative should be sent to a foreign country is settled easily by sending to every country one with the same title as has that country's representative to us. All foreign diplomatic representatives are appointed by the president with the consent of the Senate. See AMBASSADOR; CONSUL.

Dipper, a bird which dips, dives, or ducks under water. See OUZEL.

Dirce, der′sē, in Greek legend, the second wife of Lycus. See FARNESE BULL.

Disciples of Christ, or **Christians,** a religious denomination often called "Campbellites," from their founder, Alexander Campbell of Bethany, Virginia.

This denomination has had a rapid growth, and is now the fifth largest Protestant body in the United States. There were in 1921, 9,692 churches in the world with a membership of 1,277,231. In the United States and Canada for the same period there was a membership of 1,210,023, with 6,079 preachers, of whom 304 were colored. The Bible School enrollment for the world in 1921 was 1,063,890.

The denomination is divided into four departments: The United Christian Missionary Society; The Board of Education of the Disciples of Christ; The Board of Temperance and Social Welfare, and the Association for the Promotion of Christian unity. Foreign mission work is carried on in 10 countries, and in 1921 there were 275 missionaries carrying on this work. There were in 1921 27 colleges with an enrollment of 9,561 students.

Dis. See PLUTO.

Discount, in general a deduction made for any reason from a debt, a price, or an account. In a more specific sense discount is a charge made by a banker for advancing money on a bill or note not yet due, the amount of discount charged being equal to interest on the face of the note for the length of time between the date of payment and the date on which the note becomes due. The banker deducts this amount from the face value of the note, pays the remainder, or proceeds, as it is called, to the individual presenting the document and reimburses himself by collecting the note when it becomes due.

Disease, dĭz-ēz′, a serious disorder of the system. The literal meaning of the term is want of ease, uneasiness, distress. The term is difficult to define. A bruise, a burn, drinking lye, taking poison, the action of certain chemicals, all cause want of ease—pain; but their action, however fatal, is not termed a disease. A cold, a headache, hunger, overeating, overheating, or indigestion may cause distress and even death, but are hardly called diseases.

A very large group of infectious diseases may be described not inappropriately as an attack made by minute plant and animal forms on the living cells of the whole or a part of the body. Two scientific discoveries have laid a foundation for the understanding of this class of diseases. First, that the human body, as well as all animals and plants, is made up of cells. Secondly, that exceedingly small plants and animals of many kinds, known variously as molds, bacteria, and protozoa, enter the body, multiply rapidly, attach themselves to the cells, absorb their sustenance, and destroy them. This statement is true not only for man but for the lower animals and for plants as well. These destroying, disease-causing pests are parasites. They feed on living cells and on the corpuscles of the blood. A colony of one particular bacterium or plant feeding on the lungs produces tuberculosis or consumption; another kind spreads over the throat like a mold, causing diphtheria. Typhoid fever, pneumonia, cholera, lockjaw, cancer, influenza, erysipelas, the plague, and glanders are due each to its specific bacterium or parasitic plant growth. Other diseases again are due to attacks of low microscopic, parasitic animals. Malaria and many skin diseases are of this sort. Sometimes the cells of the body are destroyed by the organism direct; sometimes a poison is manufactured which kills the cells. None of these plants or animals can do harm unless they gain entrance to the body. Many of these can do no harm unless they find the body weak or injured. Diphtheria, for instance, finds ready lodgment in a raw "cold throat." Tuberculosis is powerless unless it finds weak lungs. Improper food and impure water are two prolific sources of disease. Preventive medicine consists in keeping the body in health and strength to resist the attacks of germs and in providing pure air, food, and water that the germs may not enter the system.

Disestablishment, in modern politics, the separation of church and state, or, to be particular, the withdrawal of state support from a church that has long enjoyed an income from public taxation. It is not inaccurate to say that an established church is characteristic of states having a dominant religious body. In Mohammedan countries mosques are maintained at public expense. In Russia the Greek Orthodox church is supported by the state. Catholic countries, usually, but not always, maintain a state church. France, Brazil, and Mexico may be named as notable exceptions. The Lutheran states of North Europe support the Lutheran religion. Scotland maintains the United Presbyterians, largely at public expense, and leaves other denominations to provide for their own support. England takes care of an established church, the Protestant Episcopal, or Church of England, in similar fashion. The established church of England is also the established church of Wales, although the majority of the people belong to other churches. There are no established churches in North America, save in some of the small states south of Mexico. There are no established churches in New Zealand or in the Commonwealth of Australia. The Catholic church was disestablished in Brazil in 1889, in France in 1905.

A fight for the disestablishment of the Protestant Episcopal church in Ireland is one of the longest parliamentary contests on record. Although the population of Ireland was overwhelmingly Catholic, the English authorities divided the island into parishes, and forced the populace to pay of their poverty for the support of a Church of England clergy. After centuries of occupation the Church of England, or the Established Church of Ireland, as it was known officially, included but thirteen per cent of the population in its fold. This Irish Church, which was never Irish, was disestablished by act of Parliament in 1869, when William Gladstone was prime minister.

Disinfectant, a substance or an agent relied upon to kill or render powerless the microbes and germs which produce diseases. The reader may consult the articles on BACTERIUM and DISEASE for some notion of the relation the former bear to the latter. A disinfectant is sometimes called a germicide. The best disinfectants or germ killers of all are sunlight and air. Most germs wither and die in bright light and pure air. Heat is a germ killer. Sufficient heat in any form—dry, boiling, steaming, or burning—kills microbes. Freezing kills many germs, but the typhoid bacillus lives for months in solid ice. Among chemical germ killers the best general agent is chloride of lime. It is not expensive. Three pounds of chloride to eight gallons of water makes a solution that kills all common germs. Common whitewash is excellent. Corrosive sublimate highly diluted in say 1,000 parts of water is a certain but unpleasant and even dangerous disinfectant. Carbolic acid, in the proportion of a fourth of a pound to a gallon of water, is efficient in most cases. Fumes of burning sulphur are exceedingly disagreeable. They spoil the appearance of furniture and are not regarded as efficient. Formaldehyde gas is the disinfecting agency used by health officers in fumigating rooms and houses to cleanse them from germs of contagious disease. See DRUGS; DISEASE; BACTERIUM.

Dismal Swamp, one of a series of swamps on the Atlantic coast. The great Dismal Swamp proper is about ten miles wide and thirty long. It crosses the border line between Virginia and North Carolina. Drummond's Lake, a body of water about seven miles long, lies in its midst. A large part of the swamp was covered formerly with cypress forests, through which refugees waded knee-deep in water, running a chance of being bitten by venomous moccasin snakes at every step. Before the Civil War it was a place of refuge for escaped slaves. They made small clearings on dry bits of land surrounded by impassable jungles. They lived on provisions obtained from the neighboring plantations, and on half wild hogs, game, berries, garden truck, and fish. A picture of a settlement of this sort is given by Mrs. Stowe in her *Dred*. The surface of the Dismal Swamp is raised above the adjacent country by an accumulation of moss and decaying timber. Of late extensive ditches have been dug and a large part of the swamp converted into fertile, agricultural land. A north and south canal has been constructed by the national government at the expense of $1,000,000 to enable ships to make a short cut and avoid the storms met in rounding Cape Hatteras.

Dispensary System, in liquor legislation, the sale of intoxicants by city or state. In 1893 the state of South Carolina decided to take over the sale of liquors. Saloonkeepers were given six months' notice to get out of business. The state dispensaries opened for business July 1, 1893. Among the features of the system were: (1) Sale by salaried officials; (2) Only known and guaranteed liquors to be sold; (3) Liquors were to be sold only between sunrise and sunset; (4) Liquor was to be sold only for cash; (5) Liquor was to be sold only in sealed packages, not less than one-half pint and not more than one and seven-eighths gallons; (6) Drinking of liquor on the premises was forbidden.

Among the supposed gains were the absence of saloons and loafing places, a decrease in the consumption of liquors, and an increased revenue to the state.

The new system was fought by prohibitionists, by saloon-keepers because it drove them out of business, and by politicians because it deprived them of one means of controlling voters. This law was persistently fought at the polls, in the courts and in the legislature. In 1906 the system was changed. The several counties were authorized to maintain county dispensaries and shut out saloons, the state to sell to the county at a profit of six to ten per cent, which was to go to the school fund. In 1920 the eighteenth amendment to the Constitution of the United States prohibiting the sale of intoxicating liquors as beverages was adopted, and with it the dispensary system became a thing of the past.

Dispersion, a term in physics to denote

the separation of a beam of white light into its component colors. Let a beam of sunlight pass through a narrow slit and fall upon a prism, and it will be separated into red, yellow, green, blue and violet colors, which merge with each other imperceptibly, forming a solar spectrum, and displaying all the colors of the rainbow. This separation is due to the varying degrees of refraction caused by the deficiencies in the wave lengths which produce the respective colors. The red is refracted least and appears at the top, while the violet is refracted most and appears at the bottom of the spectrum.

The use of filters in the preparation of half tones in color depends upon the principle that only the color like that of the filter can pass through the filter. Hold a red glass in the beam of light after it has passed through the prism, and the red only will appear on the screen. A green glass shuts out all colors but green, a blue glass all but blue, and so on.

Displacement. A solid body placed in water displaces a quantity of the liquid equal to its own bulk, or equal to its own weight, if it is lighter than water. Casks, ships and other hollow objects displace a quantity of water equal to their weight, hence, the term displacement, in a technical sense, means the weight of the object measured by the weight of the water it displaces. The displacement of ships in the United States and England is measured in tons of 2,240 pounds. In countries using the metric system it is measured in 1,000 kilograms equal to 2,204.6 pounds.

Disraeli, diz-rā′lee, **Benjamin** (1804-1881), an English statesman. He was of Jewish ancestry but joined the Church of England. He was educated for the law but took up the profession of literature. His first novel was *Vivian Gray.* In 1837 he entered Parliament; in 1852 he became a member of the cabinet under Lord Derby; in 1868 he became prime minister—the height of his ambition. He was a rival of Gladstone. He stood for the interests of the ancient aristocracy rather than for those of the people, and favored a strong foreign policy; that is to say, the acquisition of foreign territory. During his long official career he was opposed to the extension of the right of voting; yet, for political reasons, was obliged to bring forward one of the most sweeping reform bills. Queen Victoria favored Disraeli more than she did Gladstone, yet refrained from offensive interference. In 1876 she created Disraeli a peer with the title of Earl of Beaconsfield. He was a man of acute intellect and an able speaker. He was fond of the primrose. On that account it was adopted as a party flower to be worn by the Tory women at political meetings. Primrose leagues were formed among his followers. During his busy life, Disraeli wrote a number of novels, including *Conings by, Sybil, Tancred, Endymion,* and *Lothair.* They were quite popular as political novels, owing to the fact that many of the characters were public people but thinly disguised. His work is not expected, however, to live as literature. See GLADSTONE.

SAYINGS.

It is much easier to be critical than to be correct.

The secret of success is constancy to purpose.

Man is not the creature of circumstances. Circumstances are the creatures of men.

Patience is a necessary ingredient of genius.

Youth is a blunder; manhood is a struggle; old age a regret.

To be conscious that you are ignorant is a great step to knowledge.

His Christianity was muscular.

The world is a wheel, and it will all come round right.

Nurture your minds with great thoughts. To believe in the heroic makes heroes.

He is intoxicated with the exuberance of his own verbosity.

SAID OF DISRAELI.

Lord Beaconsfield was one of the most remarkable men of the nineteenth century. If not possessed of actual genius he was endowed with great intellectual power, and he had astonishing tenacity of purpose and showed remarkable tact and ability in managing men.

Entirely original, and never echoing any other writer.—Nicoll.

Disraeli's popularity as a novelist is, doubtless, to a great extent due to his prominence as a statesman.—Emery.

Distaff, dĭs′taf, in hand spinning, a cleft stick about three feet long, on which was fastened a quantity of wool, cotton, or flax, as it came from the cards. The

lower end of the distaff was held between the spinner's left arm and side, leaving the hands free to draw out some of the fibers, twist them into a thread, and wind the thread on the spindle. The spindle was suspended, or set in a whorl, so arranged as to revolve like a top, thus aiding in twisting and winding the thread. The seventh of January used to be called St. Distaff's day, because at that time women resumed their ordinary occupations of spinning, weaving, etc., after the interruption of the Christmas festival. See CARDING; SPINNING.

Distilling, separating one substance from another by evaporation. Nature carries on distillation on a grand scale. The heat of the sun causes the water of the ocean to rise or evaporate, leaving the salt, the iodine, and other substances behind. The vapor is cooled in the upper regions, and clouds of distilled water are formed. If brine be heated in a kettle the vapor may be caught in a handful of wool, supported by a few sticks laid across the top, and water thus separated from the salt—distilled water—may be squeezed from the wool. If we fit a tea kettle with an air-tight cover, and convey the vapor from the spout through a coil of tubing so that the steam may cool and trickle drop by drop into a cup set to catch it, we have a still. If the conducting coil of tubing pass through running water to keep it cool the three essential features—the retort, the condenser, and the receiver—of a modern still are present. If the liquid obtained be not pure it may be redistilled. Distilling proceeds on the principle that of substances in solution, that is to say, in a liquid form, some vaporize or evaporate more readily than others. Alcohol vaporizes more readily than water, and will rise from a mixture, leaving the water behind. If water, salt, and alcohol be mixed, water and alcohol together may be secured by vigorous heating. A second distillation with gentle heat will drive the alcohol over the divide, and leave the water undisturbed. Sometimes the substance left behind is quite as desirable as the substance that is distilled. When the flow of the Georgia pine is placed in a still both products of distillation are desired. The oil of the pine, or turpentine, which is distilled, and the gum or resin, which is left behind, are valuable.

Distillation was employed by the ancients in the preparation of oil from the wood of cedar. Whether the alchemists of the Middle Ages thought that some occult power might lie in animal shapes, or whether the animals suggested shapes for their retorts, their stills are pictured as having the odd forms of a clay ostrich, a pelican, a goose, a standing bear, etc.

Distillation has a wide application in modern industry. Destructive distillation, for example, which frequently accompanies combustion of substances, is instrumental in producing certain transformations of fuels of great commercial importance. In its widest sense destructive distillation implies the decomposition of substances by heat without the access of air. The final residue of such a process is usually carbon, and the process is often described as "carbonization." Chief in industrial importance are the products and by-products obtained from the destructive distillation of wood and coal. From wood, charcoal is obtained by burning in an oven or "charcoal mound," or in a heavy iron retort, consisting of a cylinder set in brickwork. The by-products include organic acids, volatile oils, and liquid and solid hydrocarbons known as wood tar. From a practical standpoint, wood tar has not found as extensive application as coal tar. In some distillation works it is burned underneath the retorts in much the same way as fuel oil; it is used to some extent in ship caulking and is applied to hemp ropes; and is now refined in some plants into drug or medicinal preparations, and also serves as a paint material. The light oils of the tar are used as shingle stains, while the heavy residue of "pitch" constitutes the base of paints used in the damp-proofing of brick and concrete walls and for application to metallic surfaces.

Destructive distillation of coal results in many useful products, including gases, liquids and solids. It yields coke, illuminating gas, and coal tar with its innumerable by-products, including many of the oils, dyes, etc, that enter into our daily

life. The coal tar, when distilled, is usually sold to refiners, who obtain the valuable products from it by processes of redistillation and otherwise.

Distillation in the popular view, however, is largely concerned with the manufacture of alcoholic liquors. It is a simple, natural process which may be carried on with ordinary household utensils, as already noted, though the commercial manufacture of liquors demands more elaborate equipment, often including patent stills of great size and capacity. Alcoholic liquors may be distilled either from fermented liquors or directly from raw materials which contain a large percentage of sugar or starch. Thus brandy is procured by distilling wine, which has already undergone the process of fermentation; while Jamaica rum is made directly from the sugar of molasses, and whisky can also be made direct from starchy materials such as corn, rye, barley, etc.

In distilling liquors, the process may be conducted so as to produce either alcoholic beverage or a raw spirit which must be "rectified" to make it fit for drinking. Some of the largest distilleries in the world produce only the raw, undrinkable spirit, which comes from huge patent stills in the form of a fiery colorless liquid and is sold to rectifiers. Rectified spirit is also largely used in the arts and manufactures, and when purified furnishes the absolute ethyl alcohol of the drug store and the laboratory.

In ancient times all intoxicating drinks appear to have been fermented only, and the art of distilling for beverage purposes was first mentioned in the tenth century by an Arabian physician. Distilled spirits early received the name of "aqua vitae," or water of life, and one of the first doctors to prescribe liquor, we are told, "declared this admirable essence to be an emanation from divinity, an element newly revealed to man, but hid from antiquity because the human race were then too young to need this beverage, destined to revive the energies of modern decrepitude," —which goes to show, in the light of latter-day history, how doctors have differed from time to time.

In all distilled spirits, alcohol is the essential element. It is formed by the decomposition of sugar, which in fermentation is resolved into carbonic acid and alcohol. When starchy substances are employed as the raw materials of distilling, the starch is first converted into sugar, by means of a substance called diastase which is found in germinating seeds and in malt. Thus it will be seen that fermented liquors are ready for distillation without further preparation; if the raw material is a sugar, it must first be fermented, and if it is a starch, it must first be convered into sugar and then fermented, prior to distillation.

Starchy materials are first "mashed," by cooking the raw grain, such as corn, barley, oats or rye, with malted grain and ground malt, and water, to form what is called "wort." Potatoes are largely used as raw material in Germany, but otherwise the process is similar. The wort or "mash" is then fermented by the addition of yeast, and after from three to nine days the liquid wort is ready for the still. When heat is applied, the alcoholic spirit passes over in vapor, which is condensed by cold as it passes through the "worm," or condensing coil. The product of the first distillation is usually a weak and impure liquid, which is redistilled to remove water and harmful oils that have passed over with the alcohol.

Rectifying is the process which renders the spirit fit for consumption, and adds flavoring and coloring matters, by which the various alcoholic liquors of commerce are distinguished. Manufacture, sale and transportation of intoxicating liquors are now prohibited in the United States. The quantity of distilled spirits formerly produced in the United States averaged about 185,000,000 gallons annually, of which about 140,000,000 gallons were for home consumption.

The distilling processes connected with refining petroleum are among the most extensive in the world. See ALCOHOL.

Distinguished Service Medal. See WAR, THE GREAT.

District of Columbia, a tract of land acquired by the national government as a site for the capital. The discomfort of

having no permanent seat of government or territory within which Congress might be protected in its deliberations led to the passage of an act in 1790 for the selection of a tract of land on the Potomac. A commission of which Washington was a member laid out a district ten miles square, lying partly in Maryland and partly in Virginia. The two states ceded the desired land to the national government. In 1846 the portion south of the river was receded to Virginia. The present territory is a trifle less than seventy square miles in extent, nearly ten miles of which are swamp and water. Congress met in the new district on the first Monday in November, 1800. Various plans of governing the District have been tried. Under act of June, 1878, local affairs were placed under the management of a commission consisting of two members appointed by the president and confirmed by the Senate and of one army officer detailed by the secretary of war. Congress may be regarded as the city council. One-half the expenses of the district is paid by Congress; the other half is met by local taxation. National property is, of course, exempt from taxation. No elections are held in the district. Citizens live in the district without losing their legal residence in the various states, and may return home to vote. The population in 1910 was 331,069. See WASHINGTON.

Divi-Divi, dē-vē′-dē-vē′, the pods of a legume-bearing tree of the West Indies and South America. The tree is related to Brazil wood. The pods are about an inch wide and three inches long. They are thin and curl up. The color of the best is a golden brown. Divi-divi pods are astringent. They are rich in tannin. They are employed for tanning leather and have become an important article of commerce. The tree grows to a height of 20 to 30 feet and produces about 100 pounds annually. Divi-divi is said to tan leather with great rapidity. Large quantities are imported annually to the United States.

Divination, the art of foretelling the future by means of signs and omens. It was resorted to among the ancients before any important step was taken. The Greeks consulted the oracle at Delphi. The augur, or foreteller of events, was a public official of the Romans. He understood how to interpret the flight of birds, the movements of clouds, the behavior of smoke, and particularly how to interpret the future from the intestines of animals offered up for sacrifice. No Roman began a journey or engaged in an important enterprise without first inquiring whether the signs were favorable.

Traces of the old custom of divination linger. There are still those who believe that a branching rod of witch-hazel may be used to locate underground reservoirs of water. Palmistry, or the study of the creases in the palm of the hand, affords at least amusement for the parlor. Many believe in dreams. Fortune-telling and the study of grounds in a teacup must be included here.

See ASTROLOGY; WITCH-HAZEL; DELPHI; PALMISTRY.

Diving, the art of plunging beneath the surface of water and remaining for a time. Many diving birds rely upon this method of securing food and of escaping their enemies. The loon, the cormorant, and the penguin are good examples. The otter, seal, and whale are skillful divers, and can remain under water for a considerable length of time. Many diving bugs carry down bubbles of air beneath their wing covers. A person does well to remain under water eighty seconds. The most skillful divers are perhaps the pearl and sponge fishers of the Mediterranean and East Indies. Divers who require to work under water laying and repairing water mains, examining or raising wrecks, and the like, usually wear a diving armor or diver's suit. It is water proof throughout. The head is surrounded by a large hollow helmet with a glass front. A force pump in the boat above and a flexible tube are relied upon to supply fresh air. A signal cord enables the diver to send word above when he desires to be drawn up. The latest improvements consist of a steel reservoir of air lashed to the diver's back from which he breathes air from a tube. Another contrivance is the diving bell. It is shaped like an inverted water pail. It is tall

enough for a man to stand within on a crosspiece. It sinks of its own weight, imprisoning and carrying down air enough to support the workman for some time. A diving bell is considered a more clumsy, and is certainly a less portable device, than the diving suit. It may be supplied with fresh air as in the case of the diving suit.

Divorce. The legal dissolution of the marriage relation. The term is strictly applied to the dissolution of legal marriages, the term "annulment" being applied to the dissolution of marriages that are void from the beginning, as in the case of the marriage of minors. In the United States and most other countries a decree of divorce is granted by courts of record. When no blame attaches to the wife she is usually granted a specific sum for support. This is known as alimony.

The Roman Catholic church does not recognize divorce and priests are not authorized to remarry divorced persons. The Church of England took the same position for many years, but this was overruled by an act of Parliament in 1858. The church, however, is still opposed to divorce and the clergy in the United States as well as England have the right to refuse to remarry divorced persons.

CAUSES. Statistics compiled by the United States government show the following to be the chief causes of divorce. They are stated in the order of frequency. Desertion; cruelty; unfaithfulness; neglect of support; conviction of felony; habitual drunkenness. There are, however, certain causes which courts may consider sufficient or insufficient. Among these are insanity, refusal of the wife to move into the state, and incompatibility of temperament. In England, however, insanity that is incurable is considered a sufficient cause of divorce in all cases. In some localities, especially in large cities, one of the most common causes of divorce is hasty marriage.

In the United States divorce is regulated by state legislation and the laws are far from uniform, it being much easier to obtain divorce in some states than in others. As a rule the older states are more conservative in granting decrees. To secure a decree one must be a resident of the state for the time prescribed. The time varies from three to five years in Massachusetts to six months in Idaho and Texas. In most states it is two years; in some only one. In some states the parties cannot remarry, but in most states the restriction is for one or two years. In some states there is no restriction. Persons divorced in one state may be married in another where there is no restriction. In such cases, however, the marriage may not be recognized as legal should the parties remove to a state having a restrictive law. Rapid increase in divorce in the United States points to the necessity for a national divorce law which would make requirements uniform throughout the country.

CANADA. By the British North America Act the Dominion Parliament has the sole power to deal with divorce except in those provinces where this power had been granted to the courts before the Dominion was formed. These provinces include Nova Scotia, New Brunswick, Prince Edward Island and British Columbia. In the provinces of Quebec and Ontario and those provinces which have been admitted to the Dominion since it was formed, application for divorce must be made to the Dominion Parliament, by which it may be granted through a special act of legislation, a measure not lightly sought.

ENGLAND. Causes for divorce in England are practically the same as in the United States but decrees are not as readily granted. The law of 1921 simplifies methods of procedure and reduces expense, thus making it possible for all classes to secure relief through divorce courts. For a long time divorce in England was possible only to those who were possessed of sufficient wealth to enable them to pay court expenses. See HUSBAND AND WIFE; MARRIAGE.

Dix, Dorothea Lynde (1802-1887), an American teacher, writer, and philanthropist. She was born at Hampton, Maine, and died at Trenton, New Jersey. Miss Dix was one of the most useful women America has produced. She taught

school in Worcester and in Boston. In 1830 she fell heir to property that enabled her to devote her life to the unfortunate. In 1834 Miss Dix went abroad to study English and European methods of caring for criminals, lunatics, and paupers. She was urgent in advocacy of hospitals, of clean and well-kept poorhouses, of institutions for the deaf, dumb, and blind, and of orphan asylums. Her greatest work, however, lay in the direction of persuading lawmakers to provide public asylums for the insane. In this work she visited many states and addressed legislatures. Over thirty insane asylums were established. Through her efforts Congress passed a bill setting aside 10,000,000 acres of land for the maintenance of asylums for pauper lunatics, but President Pierce vetoed the measure. One result of a trip to Europe was the publication in 1845 of *Prisons and Prison Discipline*. She wrote also a number of books for children. During the Civil War Miss Dix superintended the hospital nurses of the Federal service. In 1903 an effort was made to secure a national appropriation of $10,000 for the erection of a suitable memorial at her birthplace. The chairman of the Congressional committee wrote, "Miss Dix occupies a conspicuous place in history as a philanthropist. Certainly no other woman in modern times has done more to earn the gratitude of the people of this country than this self-sacrificing and devoted woman."

Dix, Gen. John A. (1798-1879), an American soldier and statesman. A native of New Hampshire. He was about to enter West Point when the secretary of war, needing troops for the War of 1812, offered him an ensign's commission. He acquitted himself creditably at Sackett's Harbor, and at the close of the war remained in military service, rising to the rank of major. In 1828 Dix, who combined activity and scholarship in a remarkable degree, resigned and began the practice of law at Cooperstown, New York. He soon became engaged in state politics, and was known as a member of the "Albany Regency," a handful of able and honest Democrats who controlled New York politics. It is difficult to pass by his eminent services as a state office-holder and legislator. He was active in the establishment of normal schools, promoted the natural history survey of New York, and became identified with large financial interests. His name was a synonym for honesty. On the discovery of gigantic frauds in the New York postoffice, Dix was persuaded to accept the postmastership long enough to restore public confidence. During the closing year of Buchanan's administration Dix was president of the Rock Island Railroad. Howell Cobb, secretary of the United States treasury, abandoned his post and went over to the Confederacy. Money was needed; financial ruin threatened the government. Wall street bankers offered to loan money if they might suggest a treasurer in whose ability, loyalty, and integrity they had confidence. Dix was the man, all parties concurred. As secretary of the treasury he had charge of the United States revenue cutters, and, hearing that the commander of a cutter off New Orleans was acting suspiciously, Dix sent orders for his arrest, adding the words that have made him famous, "If any one attempts to haul down the American flag, shoot him on the spot." During the Civil War Dix rendered skillful military service, rising to the rank of major general. He became governor of New York and minister to France. His character may be summed up in the words, honor, ability, and intense patriotism.

Dixie, the Southern States. The origin of the term is involved in dispute. Some hold that it is derived from the term, Mason and Dixon's line, that divided the slave from the free states. Others claim that the name sprang from a certain Dixie, a large slaveholder of Manhattan Island. He permitted his servants to enjoy life so well that Dixie or Dixie's became a traditional term in negro minstrelsy for a sort of earthly paradise.

Dixie, a famous song of the Southland. Dixie was composed by Daniel C. Emmett, known familiarly as Dan Emmett. Mr. Emmett told the story of this stirring song as follows:

The original title of my "Dixie" song was "I Wish I Was in Dixie's Land." It was written, or, rather, finished, when I was a member of

Dan Bryant's minstrels, then located at Mechanics' Hall, 470 Broadway, New York City. I went with Bryant in '59, and "Dixie" was written a year later, but not on a rainy Sunday, as is generally supposed and certain Boswells have seen fit to put it. The idea for "Dixie" was conceived long before my joining Bryant. "I wish I was in Dixie" was a circus expression that I heard up North while traveling with canvas shows. In those days, all below the Mason and Dixon line was considered South, and it was a common occurrence, of a cold day, when traveling through the North, to hear a shivering circus man remark, "I wish I was in Dixie's land." "Dixie" never impressed me as being as good a song as "Old Dan Tucker," which was one of my first compositions, but "Dixie" caught on from the first, and before I knew it, it had taken the country by storm. We kept "Dixie" on for six seasons. I always look upon the song as an accident. One Saturday night, Dan Bryant requested me to write a walk-around for the following week. The time allotted me was unreasonably short, but, notwithstanding, I went to my hotel and tried to think out something suitable, but my thinking apparatus was dormant; then, rather than disappoint Bryant, I searched through my trunk and resurrected the manuscript of "I Wish I Was in Dixie's Land," which I had written years before. I changed the tempo and rewrote some of the verses, and in all likelihood, if Dan Bryant had not made that hurry-up request "Dixie" never would have been brought out.

I wish I was in de land ob cotton,
Old time dar am not forgotten,
  Look away! Look away! Look away! Dixie Land.
In Dixie Land whar I was born in,
Early on one frosty mornin',
  Look away! Look away! Look away! Dixie Land.

  Den I wish I was in Dixie,
    Hooray! Hooray!
  In Dixie Land, I'll take my stand,
  To lib an' die in Dixie,
    Away! Away!
  Away down South in Dixie
    Away! Away!
  Away down South in Dixie.

Old missus marry Will de weaber,
William was a gay deceaber,
  Look away! Look away! Look away! Dixie Land.
But when he put his arm around 'er
He smiled as fierce as forty pounder,
  Look away, etc.

His face was sharp as a butcher's cleaber,
But dat did not seem to greab her,—
  Look away, etc.
Old missus acted de foolish part
And died for a man dat broke her heart,—
  Look away, etc.

Now here's a health to the next old missus,
And all de gals dat want to kiss us,—
  Look away, etc.

But if you want to drive 'way sorrow
Come and hear dis song to-morrow,—
  Look away, etc.

Dar's buckwheat cakes and Injun batter
Make you fat or a little fatter,
  Look away, etc.
Den hoe it down and scratch your grabble
To Dixie Land I'm bound to trabble
  Look away, etc.

Dixon, dik'son, **George,** an English navigator. He was an officer on the Resolution during Cook's last voyage. Later he was sent out on an independent exploring expedition and discovered the Queen Charlotte Islands. He was the author of *A Voyage Round the World,* published in 1789. He died about 1800. See COOK, JAMES.

Dixon, Thomas Jr., (1864-), an American novelist and playwright who has also been a legislator, a minister and a lecturer. He was born at Shelby, N. C., and was graduated from Wake Forest College in 1883. During 1885-86 Mr. Dixon served in the North Carolina Legislature. He resigned to enter the Baptist ministry, and in 1887 was pastor of a Baptist church at Raleigh, N. C. The greater part of Mr. Dixon's novels and plays deal with the South and the Negro problem. *The Clansman* and *The Leopard's Spots* are his two most important novels of this kind. From *The Clansman* D. W. Griffith adapted the well known moving picture *The Birth of a Nation.* Other important works by Mr. Dixon are *The Sins of the Fathers; The Southerner; The Victim; The Foolish Virgin; A Man of the People; The Man in Gray;* and another well known moving picture, *The Fall of a Nation.*

Dnieper, a river of Russia, which rises in Smolensk and flows in a southwest, southeast and again southwest direction to the Black Sea. It is navigable a little above Smolensk, and has a total length of 1,230 miles. It has several tributaries, among them the Beresina, the Pripet, the Desna and the Psiol. The fisheries are important in its lower course. There is a heavy steamboat traffic on the river, and the trade between river ports is extensive and profitable.

Dniester, a large river of southwest Russia which has its source in the Carpathian Mountains. After a course of 350 miles it reaches the Russian frontier, west of Khotin. It forms the boundaries between Bessarabia, Podolia and Kherson. Its course is winding and it reaches the Black Sea by two openings between Ovidiopol and Ackerman. Improvements have been made making the river navigable from Khotin to the sea. Its commerce is large and consists mostly of grain and lumber. The river abounds in fish, which afford a means of livelihood to those who live near it. Its total length is over 850 miles.

Dobson, the larva of the corydalis, a large insect allied to the ant-lion. The eggs of the corydalis are attached to objects overhanging a stream. As soon as hatched the larvae enter swiftly running water and hide under stones for nearly three years before they pupate and go ashore to become flying insects. The larvae attain a length of two inches, and are an excellent bait, especially for bass. Anglers call them "dobsons," and look for them under stones where the water is swiftest. The adult insect has long feelers and a wing expanse of five inches.

Dobson, Henry Austin (1840-), an English poet. He was born at Plymouth, England. In 1856 he became a clerk in the Board of Trade, and later one of the officials known as principals. His earliest verses were published in *St. Paul's* magazine, and later in book form under the title *Vignettes in Rhyme,* and *Vers de Société. Proverbs in Porcelain, Old World Idylls,* and *At the Sign of the Lyre* are other volumes of poetry. Dobson has also produced prose works, among them the Lives of Fielding, Hogarth, Goldsmith, and Walpole. Dobson is probably the best and most popular author of that class of poetry called "Society verse," much in vogue during the latter part of the nineteenth century. "Society verse," of whose French name, *"Vers de Société,"* the English translation is a poor equivalent, is marked, Stedman tells us, "by humor, by spontaneity, joined with elegance of finish, by the quality we call breeding—above all, by lightness of touch." Dobson's verses display these characteristics to a marked degree. He also makes admirable use of the French forms, rondeau, rondel, and triolet, in many beautiful little poems.

Dock, a sour-juiced herb allied to rhubarb and buckwheat, as may be noted by the shape of the seed. Another ally is the sheep sorrel (not wood sorrel) of run-out fields. The leaves of the various kinds differ greatly in shape, but their margins are curly. Boys find a dock leaf, well rubbed in, a convenient remedy for the sting of a nettle. Decoctions of dock root are of value in medicine. The water dock, with its large leaves and acrid root, was held in reverence by the Druids.

Dock, a nautical term. It may refer to a deep-water wharf with facilities for loading and unloading large ships. A dry dock is an inclosure in which ships may be repaired. A ship enters dock by means of a doorway; it is then propped in an upright position; the water is allowed to run out at low tide, or else it is pumped out of the inclosure, in order that workmen may reach the hull to make repairs. A dry dock is requisite to the business of repairing ships. There are a number of docks on the Atlantic coast. The more important are located at Portland, Portsmouth, Charleston, Brooklyn, Elizabeth, Philadelphia, Wilmington, Baltimore, Newport News, Norfolk, New Orleans, and Port Royal. Montreal has large new docks. On the Pacific coast there are dry docks at San Francisco and Port Orchard. That at Mare Island, near San Francisco, is 739 feet long. It is built of granite, and admits ships drawing thirty feet of water. A large number of docks are located also on the Great Lakes, as at West Superior, Marquette, Milwaukee, Chicago, Port Huron, Toledo, Cleveland, and Buffalo. Many of these docks are of great size, several hundred feet in length. The British government and ship owners maintain docks, we may say, all over the world, for the repair of ships carrying the British flag. There are docks at Gibraltar, Malta, Halifax, Bermuda, Cape of Good Hope, and Hong Kong. A dry dock at Hamburg is capable of raising a load of 35,500 tons.

The floating dock used for smaller vessels is practically a submerged raft, or jacket, into which a ship fits itself and is braced firmly in position. The water in large reservoirs is then replaced by air, causing the dock to rise and float, lifting the ship up out of the water.

Dodder, a peculiar relative of the morning glory. There are some fifty kinds, all leafless, worthless plants that look like pale, unhealthy runners of a strawberry. The flowers are in fleshy green clusters. The characteristic of the dodder is parasitism. The dodder drops its seed in the ground, where it takes root and sends up a tendril-like shoot that fastens itself by suckers to the stem of some other plant. It sends in rootlets to suck the sap and lives on its host, dying away at the ground entirely. There are many common dodders —all agricultural pests—as clover dodder, flax dodder, hop dodder, etc. Often dodder is a tangled mass of green and yellow threads. A search in a tangled patch of weeds, sunflowers, and the like is likely to reveal the presence of dodder. The vines have no leaves and need none. The work done by leaves is done for them by the leaves of the host plant. See PARASITE; FUNGI.

Dodge, Mary Abigail (1838-1896), an American writer, better known by her pen name of "Gail Hamilton." She was born at Hamilton, Massachusetts. For some years she taught in the high school at Hartford, Connecticut. She was one of the editors of *Our Young Folks* from 1865-67. Besides numerous contributions to current literature, Gail Hamilton was the author of *Gala Days, Twelve Miles from a Lemon, Biography of James G. Blaine, Country Living and Country Thinking,* and several other books. She was a widely known and much respected writer of current literature. Her style was vigorous, clear, and pleasing. She had a keen sense of humor, and took a deep interest in affairs which concerned the welfare of the country. She was well known among literary people. The story goes that in war times she sent Whittier a pair of slippers in facetious allusion to the well known fact that Whittier's sympathies with the North in the struggle were somewhat at variance with his Quaker principles. Each slipper was embroidered with a bristling war eagle with thunderbolts clutched in his claws, but the colors were sober, Quaker gray. Gail Hamilton's writings are little read at the present time.

Dodge, Mrs. Mary Elizabeth Mapes (1831-1905), an American editor and writer. For over thirty years she was the recognized leader in juvenile literature in America. She was the second daughter of Professor James J. Mapes. New York City was her birthplace, and she received a careful education at home under the direction of governesses and tutors. She married William Dodge, whose early death left her, while still a young woman, with two boys to care for and educate. Mrs. Dodge had always been fond of reading and writing; but it was only when she wished to earn money for the education of the boys that she turned her attention seriously to writing. She was successful at once, her contributions to various magazines receiving a hearty welcome. Her first published volume was *Irvington Stories.* Her most notable book is *Hans Brinker,* a story of child life in Holland. For this story, Mrs. Dodge "ransacked libraries, public and private, for books upon Holland; made every traveler whom she knew tell her his tale of that unique country; and submitted every chapter to the test of the criticism of two accomplished Hollanders living near her. It was the genius of patience and toil, the conscientious touching and retouching of the true artist, which wrought the seemingly spontaneous and simple task." The story has passed through many editions both in England and America, and has been translated into French, German, Italian, Dutch, and Russian.

In 1870 Mrs. Dodge accepted the position of associate editor of *Hearth and Home,* and in 1873 became editor of a new magazine for boys and girls, *St. Nicholas.* To undertake this work, Mrs. Dodge gave up some cherished dreams of her own of becoming a novelist. Convinced that many could write for older people, while few had so clear a "call" to the field

of juvenile literature, she entered heart and soul into the work; and from its first issue in November, 1873, until her death, made *St. Nicholas* what she said it should be, a "place where children may come and go as they please, where they are not obliged to mind, or say 'Yes, ma'am,' and 'Yes, sir,' —where, in short, they can live a brand new, free life of their own for a little while, accepting acquaintances as they choose and turning their backs without ceremony upon what does not concern them."

Besides *Hans Brinker,* other books by Mrs. Dodge are *Donald and Dorothy, Theophilus and Others,* and a volume of poems, *Along the Way.*

Dodgson, Charles Lutwidge (1832-1898), an English clergyman. Mr. Dodgson was a distinguished mathematician and the author of several treatises on mathematical subjects. Over the pseudonym of Lewis Carroll, he wrote stories for children, which have made him famous. The earliest of these was *Alice in Wonderland,* followed by *Through the Looking Glass, The Hunting of the Snark,* and *Sylvie and Bruno.* It is said that, when *Alice in Wonderland* was published first, Queen Victoria read it with great delight. She was so pleased that she sent out immediately for all of Mr. Dodgson's previous works, and found that they dealt with logarithms and the higher calculus.

Lewis Carroll has proffered a merry antidote to the hyperaesthetic and other fads of the day. His *Rhyme and Reason* contains "Phantasmagoria" and "The Hunting of the Snark,"—bright audacities in which the fancy that created *Alice in Wonderland* plays without tether and affords delight to the healthy and fun-loving mind.—Stedman.

Dodo, an extinct bird of Mauritius. Accounts by Portuguese and Dutch navigators testify that it survived as late as 1681. Further accounts go to show that it and other animals peculiar to the island were destroyed by the numerous descendants of some hogs turned loose by sailors. No complete specimen of the dodo is known. A few scrappy bits of the bird, a foot here and a head there, have been supplemented by a number of bones found of late in a marsh, in Mauritius, from which a tolerably complete skeleton has been made up for the British Museum. The dodo had short, ill set legs, a clumsy, globular body, possibly twice as large as that of a goose, an enormous mouth, and a large bill terminating in a hook. It was heavily feathered with ashen gray plumage, but was practically wingless and had a short upcurled tail. In spite of its awkward build, naturalists classify it with the pigeon and the dove. A black, heavily built, hawk-bill pigeon of the Island of Samoa, called the tooth-billed pigeon, from notches in its bill, is considered the nearest living relative of the dodo. The island is not large, and this pigeon is likely to become extinct.

Dog, a well known animal related to the wolf, fox, and jackal. The origin of the dog is not known. Even after making allowance for the influence of domestication it is difficult to believe that a poodle and a bulldog are descended from a common ancestor. Several wild dogs are evidently closely related to the domestic dog and the wolf. The dog is by nature an animal of the chase. It has a keen scent, a good eye, is hardy, swift, and is adapted to a meat diet.

Several groups are of interest. The spaniel, the retriever, and the setter are soft, long haired water dogs. The latter derives its name from a habit of crouching when it desires to indicate the presence of game. The poodle, a homely, hairy lap-dog, full of tricks and easily taught to retrieve or fetch game, does not seem out of place in this group. The noble Newfoundland dog has a love of water and a habit of fetching and carrying, suggesting a strain of spaniel ancestry.

Hounds hunt by sense of sight. The greyhound is the swiftest dog. It has been introduced in the West for jackrabbit coursing. The whippet is an English dog employed for hare hunting. The staghound and the deerhound were used for deer hunting. The Irish wolfhound and the great Dane are magnificent, large wolf dogs. The pointer is a hound, with an acquired disposition to stand in a rigor, pointing to game which it has located in cover by the sense of smell. The blood-

hound is a dignified dog with large, wrinkled chops and pendulous ears. It was much used to trace runaway slaves and is still employed to pursue criminals, find lost children, or the like. If a shoe or garment of the desired fugitive, or an authentic footprint, can be shown this intelligent animal, it will sniff the article until it has the scent. It then courses round and round until it finds the trail of the fugitive, which it recognizes by the mere scent, even when a day or two old; then it sets off baying on the trail which it will follow for days. It is useless for a fugitive to walk fences, double back on his path, climb trees, pass through a herd of cattle, or step in the tracks of another person. The only way to throw a bloodhound off is to wade in water, and, even then, the dog will course up and down the shores for miles searching for the lost trail. In spite of his persistence, the bloodhound is not ferocious, but stands and bays at his game until his master comes up.

The St. Bernard of the old Swiss monastery is noted for having rescued many travelers from death in the snowstorms of the famous pass in which the monastery is situated.

The mastiff is a most massive, respectable type of dog. The bulldog is noted for loyalty and fighting qualities. The reader will recall Bill Sykes and his dog in *Oliver Twist*. The terrier is the most incorruptible, irrepressible watch dog in the whole dog family.

The collie or sheep dog is the most intelligent and valuable dog of the present day. The feats performed by the shepherd dog, as it is frequently called, are almost human in their ingenuity. The least that a Scotch collie will do is to chase up on the hillside and bring the sheep down to the shearer one by one as fast as they are wanted and no faster. When the sheep are penned for the night, he is on hand as anxious as can be while the count is going on, and at the least sign that any are wanting, he is off to the hills after the strays. Oliphant's *Bob, Son of Battle,* is the finest dog story in print and is comparable with *Black Beauty,* the horse story. It does the collie simple justice.

Judging from literature the standing of the dog is better than it used to be. The standing of the dog in the Scriptures is crystallized in the query of Hazael, "Is thy servant a dog that he should do this thing?" In explanation it may be said that the oriental dog as seen in Jerusalem, Damascus, Bagdad, and other cities of the East, is a miserable slinking cur, infesting the streets and living chiefly on offal.

Beginning with the fable of the selfish dog in the manger, that would not allow the hungry ox to eat hay, we find many sayings and proverbs indicative of long companionship between everyday people and the dog,—not on the whole complimentary to the dog. "Idle dogs worry sheep," say the Scotch. "He that lies down with dogs must arise with fleas," contains more truth than poetry. "Hungry dogs eat dirty puddings," hints of necessity that knows no law. "A hair of the dog that bit you," said to be a cure for the bite of a mad dog, finds its parallel in the *similia similibus curantur* or like cures like of homeopathy and the doctrine of vaccination. "Help a lame dog over a stile," says the mendicant. "The gude dog doesna aye get the best bone," is the doctrine of the canny Scot again. "Better a live dog than a dead lion," is the refuge of the fainthearted. "Give a dog a bad name and hang him," and "Any stick will do to beat a dog with," are the pleas of the lawyer for the defense.

Although Shakespeare does advise that we "Throw physic to the dogs," as though the dog were the lower stratum of domesticity, modern literature shows that the dog has risen in popular estimation. Mountainous regions and the prairies and forests of the New World, with all the features of hunting, camping, and cabin life, have developed higher characteristics. Stories of the great St. Bernard rescuing snow-belated travelers, of Newfoundlands plunging in to save drowning children, of hounds placing themselves between the cradle and fierce beasts, of watch dogs guarding their master's property with their lives, and of dogs lying on their masters' graves refusing to be comforted, are nu-

1 English Greyhound 2 Russian Greyhound 3 Scotch Greyhound
4 English Foxhound 5 Fox Terrier 6 Dachshund—Smooth Haired
7 Dachshund—Rough Haired 8 Black Field Spaniel

DOGS

1 German Bulldog 2 English Mastiff 3a Short Haired St. Bernard 3b Long Haired St. Bernard
4 Newfoundland 5 Bull Terrier 6 English Bulldog 7 French Bulldog 8 Pug or Mops

DOGS

merous and bear testimony to one of the most faithful servants and persistent adherents of man.

For a further account, the reader is referred to the chapter on the dog in Darwin's *Animals and Plants under Domestication.*

See ESKIMO; ALASKA; WOLF; FOX.

Dog-Days. See SIRIUS.

Dog-Fish, a general name applied to numerous species of fishes resembling small sharks. They are eighteen inches to eight feet long. They follow up schools of cod, herring, and mackerel, and other food fishes in hungry packs, whence their name. Fishermen dread them for the mischief they do, breaking nets, cutting lines, but chiefly driving away the schools of fish. The sea may be alive with mackerel and the fishermen reaping a harvest, when the back fins of a pack of dog-fish are seen cutting the water and all is over. The fish have gone elsewhere and must be sought anew.

Dog-Star. See SIRIUS.

Dogbane, a genus of perennial herbs. There are two species in the eastern part of the United States. Both have upright branching stems, opposite leaves, fibrous bark, and a milky juice. The spreading dogbane has delicate, open, bell-shaped flowers of a pale rose color, distributed in spreading clusters. The roots are used as an emetic. The other species has pale, erect, less open flowers crowded in close clusters. Its tough, stringy bark was used by the natives for making nets, whence the name, Indian hemp. The dogbanes belong to a large family of over a thousand species, including many Old World shrubs, vines, and trees. A number of species yield India rubber of commerce. The milktree and the cream-fruit of Africa, the periwinkle, and the cape jasmine are of the family.

Dogberry, an absurd night-constable in Shakespeare's *Much Ado About Nothing.* Dogberry is ignorant, self-satisfied, and over-bearing, but talkative and good natured. See MUCH ADO ABOUT NOTHING.

Doge, dōj, the chief magistrate of Venice. The term is derived from the Latin *dux,* and corresponds to duke. The duties of the doge were akin to those of mayor, except that he held his position for life and exercised nearly absolute power. The doge of Venice not infrequently declared war or made peace entirely on his own motion. He rewarded his friends, imprisoned and executed his enemies almost as absolutely as the Sultan of Turkey. The term is first heard of about the year 697. The dignity was extinguished by the army of the French Revolutionists in 1797. The term was similarly used, though for a shorter time, in the city of Genoa. See VENICE; BRIDGE OF SIGHS.

Dogwood, a family of flowering shrubs or trees. The common dogwood of Europe appears to be of value—its wood for charcoal, its berries for oil. There are several American dogwoods; they are as often called cornel. Two are quite showy in flower. The inconspicuous flowers are in a close head surrounded by a whorl of showy white leaves that one would naturally suppose to be the petals of the flower itself. One of these showy cornels is a dwarf about six inches high which in June carpets the low grounds of the Northern woods with white. A cluster of red berries follows later. The other showy cornel is the flowering dogwood of upland forests from Ontario to Texas. The leaves that surround the flower cluster are white, broad, heartshaped at the apex and open up three or four inches across. They are followed by handsome clusters of red berries that add brilliancy to the foliage of autumn. The other cornels are hard to tell apart. They bear flat clusters of white flowers. The purple bark of the Kinnikinic was much used by the Northern Indians as a substitute for smoking tobacco. The bright red-purple shrubs of another kind give it the name of red osier dogwood.

Doldrums, a term applied by seamen to the zone of calms near the equator where for weeks at a time there is not enough wind to move their sailing vessels. It is probable that the term originated in some way from the word dull. To be thus becalmed in this region was often a serious matter, especially if food or water was scarce. The monotony was occasionally

broken by sudden, violent squalls, another source of danger, but which were insufficient to carry the vessel into the trade-wind belt.

The word doldrums has acquired a personal significance; one of sullen moods, especially if marked by occasional bursts of temper, is said to be in the doldrums.

Doll, a toy made to imitate, usually, a child, but sometimes a grown person. The name is believed to have been derived from Dolly, an abbreviation of Dorothy. A love of dolls is universal. Children of every hue and nation delight in fondling dolls. The Eskimo child makes a doll out of a bit of bone or ivory, dressing it possibly in fur. The child of the African jungles gowns a bit of stick with forest leaves. The wooden dolls with painted faces and inexpensive clothing are made for the most part in Thuringia, and in certain sections of France and Germany. The most expensive dolls are made in France.

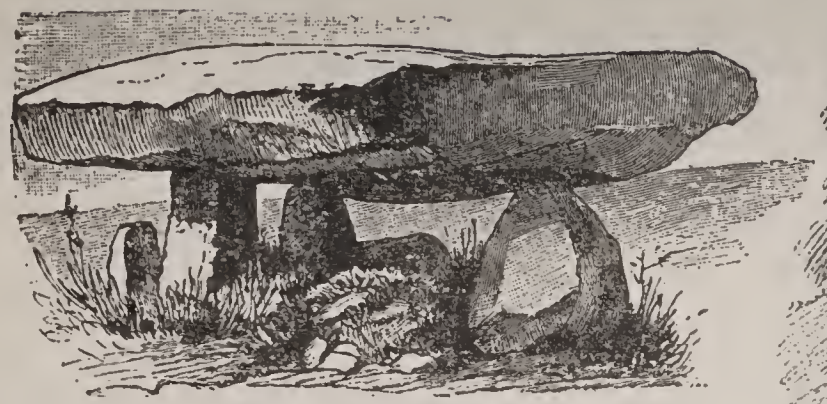
See AUTOMATON; TOY.

Dole, Nathan Haskell (1852-), a distinguished American editor, translator and poet. Born at Chelsea, Mass., he was graduated from Harvard University in 1874. After teaching for several years, Mr. Dole became musical and literary editor of the Philadelphia *Press*, in 1881. Mr. Dole translated Tolstoi's *Anna Karenina,* Daudet's *Tartarin on the Alps*, Verga's *Cavalliera Rusticana, The Memoirs of the Baroness von Suttner,* and hundreds of songs and lyrical pieces for music from the Russian. His original work includes *Famous Composers, The Hawthorne Tree and Other Poems, Alaska, Life of Count Tolstoi,* and *Poems for the Boston Public Schools.* Mr. Dole also edited various libraries of literature and oratory, the works of Count Tolstoi and *The Rubaiyat of Omar Khayyam.*

Dole, Sanford Ballard (1844-), an eminent Hawaiian statesman, holder of many important offices under the republic and the present Territory of Hawaii. Born at Honolulu of American parents, he was educated in Massachusetts at Williams College. He was admitted to the bar in Boston. Beginning practice in Hawaii, Mr. Dole was made judge of the Supreme Court there in 1887. After the overthrow of the kingdom in 1893 he was elected president of the provisional government, and in 1894 President of the Hawaiian Republic. The latter office he held until 1901. Mr. Dole denied President Cleveland's right to restore Queen Liliuokalani to the throne, and frustrated the proposed action. It was largely through the influence of Mr. Dole that Hawaii was annexed to the United States as a territory in 1900. He was Governor of the Territory until 1903, when he resigned and was appointed United States Judge of the Territory.

Dollar, an old German coin first minted from Bohemian silver in 1519 at Joachimsthal. The Joachimsthaler or thaler, for short, whence dollar, was for a time the European standard of weight and purity. The name was adopted by Spain and its colonies. Through trade with the West Indies, American merchants were more familiar with the Spanish dollar than with the English pound. Accordingly, when the American congress in 1792 established a system of coinage for the United States, the basis was made a dollar "of the value of a Spanish milled dollar, the same as is now current." The first actual American silver dollar, 1794, weighed 416 grains, and contained 371.25 grains of silver. The gold dollar contained 24.75 grains of fine gold at first, which was reduced in 1834 to 23.20 grains, and again raised in 1837 to 23.22 grains at which it now remains. The silver dollar has gone through several changes of weight. It now weighs 412.5 grains, 371.25 grains of which are silver. Since March 14, 1900, the gold dollar has been the standard of value in the United States. An English pound is worth $4.86 in gold; the silver bullion in a silver dollar is worth about 45 cents in gold. The dollar is the unit of coinage in the United States, British North America, Newfoundland, Liberia, and Mexico. See COIN; MINT.

Dolly Varden, the coquettish but warm-hearted daughter of Gabriel Varden in Dickens' *Barnaby Rudge.* In the beginning of the story she is described as a "pretty, laughing girl; dimpled and fresh and healthful—the very impersonation of good humor and blooming beauty." After



Dolmen in Britanny, France.

Double barrow, Island of Möen, Denmark.

Barrow, Island of Möen.

Long burial mound, South Sweden.

Dolmen near Lüneburg, Prussia.

Dolmen on Laaland, Denmark.

Double Dolmen, Denmark.

DOLMENS.

an interval of five years, she comes again upon the scene: "When and where was there ever such a plump, roguish, comely, bright-eyed, enticing, bewitching, captivating, maddening little puss in all this world as Dolly? . . . This same Dolly Varden, so whimsical and hard to please that she was Dolly Varden still, all smiles and dimples, and pleasant looks, and caring no more for the fifty or sixty young fellows who at that very moment were breaking their hearts to marry her, than if so many oysters had been crossed in love and opened afterwards." Dolly wears a cherry colored mantle and cherry colored ribbons. Her attire is always dainty and bewitching and gay. With no real descriptions of her costumes the author so frequently alludes to their attractiveness that the name, "Dolly Varden," has ever since been in use. In the early seventies a popular style of costume was named the Dolly Varden. A pointed bodice and a light muslin skirt, printed with gay flowers and tucked up over a petticoat of solid color, were the distinguishing features of the Dolly Varden gown. Dimity or other dainty fabrics of delicate color besprinkled with bright flowers are often called Dolly Varden patterns.

Dolmen, a rude structure consisting usually of several standing stones capped by a flat stone. The name is from Brittany, meaning stone table. The deck or covering is ordinarily a single stone. A remarkable dolmen near Saumur, France, is 64 feet long, 14 feet wide, and 6 feet high. It is rectangular in shape. There are four pillars on each side, one at the middle of each end; and the deck is formed by four enormous slabs. The cover of a notable dolmen in Cornwall is a single stone 33 feet long. It is thought to weigh 750 tons. It rests on two stones. Dolmens are found throughout Great Britain and Ireland, France, Algeria, Denmark, Norway, Sweden, eastern Palestine, and India. It is uncertain whether the dolmen was a sacrificial table or a place of burial. It seems to shade off into the burial mound formed by heaping earth over the structure and into the underground stone chamber formed by excavating and lining with stones. The dolmen is inclosed not infrequently by a circle of standing stones See BARROW; STONEHENGE; CARNAC.

Dolomite, a common rock composed of the carbonates of calcium and magnesium in varying proportions. The former alone is limestone, or when crystallized, marble, either of which the mixture may resemble, though more grayish or yellowish in color. The finer varieties are sometimes called marble. It is widely distributed, being found in England, Italy, and in the eastern part of the United States, where it is extensively used as building stone.

Dolphin, dŏl′fĭn, an open sea animal. It is not a fish. It belongs to a family of land animals that have lived in the sea so long that they are not fit to be out of it. It is warm-blooded, it suckles its young, and breathes air. Both jaws are well filled with teeth. It feeds chiefly on fish. At times the dolphin annoys the herring fishers. It has many of the characteristics of the seal, but is more closely related to the whale, and still more so to the porpoise. There are many species—at least twelve in American waters. The common dolphin is an inhabitant of the Mediterranean and the temperate parts of the Atlantic. It is about six feet long, black above, and white beneath. It has a narrow nose and a long pair of jaws. Because of this the French call the dolphin goosebeak and goose of the sea. A single nostril is situated on the top of the head. The dolphins are noted for graceful movements. They travel in schools. When they see a ship a mile or two away they come racing through the waves as if glad to see someone. They gambol and dive about the ship as if to please the passengers with their graceful capers.

In Greek mythology, the dolphin had the reputation of becoming familiarly attached to man. Apollo is represented as riding a dolphin and playing his flute. A thick body, tapering toward a fin-shaped tail, the suppression of the hind limbs and the reduction of the front limbs to fin-like flippers, as well as a fin-like appendage on the back, give all the members of the family the appearance of a fish. A large open-sea fish of the tropics, remarkable for rap-

id changes of color when taken out of the water, has been confused with the dolphin. Byron has fallen into this error:

> Parting day
> Dies like the dolphin, whom each pang imbues
> With a new color, as it gasps away,
> The last still loveliest, till 'tis gone—and all is gray.

See DAUPHIN; PORPOISE.

Dombey and Son, a novel by Charles Dickens published in serial form, beginning in October, 1846. It appeared in book form in 1848. Mr. Dombey is an aristocratic, proud, stern, unfeeling man; his only passion is a love for his little son Paul, a delicate child, who dies young. Florence Dombey is unable to win her father's affection, and is driven finally from home. Disappointed in a worldly ambition to perpetuate the name of the firm; hated by his proud and disdainful second wife, and disgraced by her elopement; bankrupted by venturesome investments, the haughty Dombey is at last utterly broken and subdued. Now the neglected daughter returns and devotes herself to making her father's last days a time of peace. As usual in Dickens' stories, there are many minor plots and side issues. As usual, too, the interest is in the characters, rather than in the story. Mr. Dombey, Little Paul, Edith Granger, Mrs. Skewton, the Carkers, Captain Cuttle, Joey Bagstock, Old Sol Gills, and Dr. Blimber are real people whom we have seen and known, and who cannot be forgotten. Two paragraphs, one from the opening, another from the closing chapter of Mr. Dombey's career, give a glimpse of his character and of the changes wrought therein:

> The earth was made for Dombey and Son to trade in, and the sun and moon were made to give them light. Rivers and seas were formed to float their ships; rainbows gave them promise of fair weather; winds blew for or against their enterprises; stars and planets circled in their orbits, to preserve inviolate a system of which they were the center.

> For the night of his worldly ruin there was no tomorrow's sun; for the stain of his domestic shame there was no purification; nothing, thank Heaven, could bring his dead child back to life. But that which he might have made so different in all the Past—which might have made the Past itself so different, though this he hardly thought of now—that which was his own work, that which he could so easily have wrought into a blessing, and had set himself so steadily for years to form into a curse; that was the sharp grief of his soul.

See DICKENS, CHARLES.

Dome, in architecture, a hollow hemisphere resting on pillars, or a supporting wall. The dome grew out of the arch, and is regarded as an invention of the Roman builders. Some of the noted domes of the world are those of the Pantheon and St. Peter's at Rome; St. Paul's, London; St. Sophia at Constantinople; the Hotel des Invalides of Paris, under which Napoleon lies; Santa Maria at Florence, and that of our own National Capitol at Washington. Cupola is a synonymous term. The open space or hall beneath a dome is called a rotunda. See CAPITOL; ST. PETER'S; ST. PAUL'S.

Domenichino, or **Domenico Zampieri** (1581-1641), an Italian painter, was born at Bologna. He studied with Calvart and with the Caracci. After he went to Rome his foremost master, Albano Caracci, procured for him many commissions. Here he produced some remarkable canvasses. His *Communion of Saint Jerome* is considered second only to that of the *Transfiguration* of Raphael. Cardinal Aldobrandini commissioned him to paint 10 frescoes, representing the *History of Apollo.* These are remarkable both for design and vigor of treatment. Few painters have equalled Domenichino in lifelike representation. The beauty of his work caused much envy at Rome, so much so that he thought of poisoning himself. But he returned to Bologna, where he worked for two years on his world-renowned *Rosary,* now in the gallery of Bologna. He was later recalled to Rome by Gregory XV, who made him the first painter of the Vatican. He lost this position when the Pope died. The latter part of Domenichino's life was embittered by the jealousies and intrigues of his contemporaries. Some 50 of his works have been engraved.

Domestic Art in Schools, that branch of home economics which includes instruction in sewing and its allied interests,—instruction in practical millinery, in the choosing and testing of textile fabrics, in the use

and care of sewing machines, and in various forms home decoration may be added to lessons in plain sewing. The work is offered at different periods in the school course, more often in the eighth grade and the high school. The best courses begin with work in the fourth grade.

Domestic Science in Schools, that branch of home economics which deals especially with the practical work of cooking.

This subject appears in the curriculums of our public schools from the third grade up. The eighth grade and the high school, however, offer the course most commonly. The chief difficulty in many cases has been a suitable equipment but as the value of the course becomes more fully realized, the expense seems proportionately smaller. See Boys' and Girls' Clubs; Canning, subtitle *Canning Clubs.*

Dominion Day, a Canadian national holiday, observed on July 1, to celebrate the formation of the Dominion. The provinces were organized into one government on July 1, 1867, in accordance with the British North America Act. Dominion Day is the most important Canadian holiday, equal in importance to Independence Day in the United States, and is observed by a fitting flag display, patriotic programs, athletic meets and in other healthful ways.

Dominican Republic. See Haiti.

Dominicans, an order of preaching friars. It was founded in the thirteenth century by St. Dominic with a view to convert the Albigenses. The order spread rapidly in France, Italy, and adjacent parts of Germany. The rules of the order were founded on those of the Augustinians. They were called Black Friars from the color of their costumes. A large monastery stood near the east end of the present bridge of the Blackfriars, London. Forty-eight Dominican monasteries were among the number suppressed by Henry VIII during the time of the English Reformation. Like the Jesuits, the Dominicans were known for scholarship. In the early days of the order no property but alms was permitted; but, as the order increased in numbers, houses and property became needful and were acquired.

Dominion of Canada. See Canada.

Dominoes, a game played with twenty-eight flat, oblong pieces of wood, ivory, or bone. The face of each piece is divided by a line across the middle into two square compartments. Each compartment is either a blank or contains from one to six pits or dots like those of dice. The lowest domino is a double blank; the highest a double six. Each number of dots from blank to six occurs on seven different dominoes, and twice on one of them. The number five, for instance, occurs opposite a six, a five, a four, a three, a two, a one, and a blank. The game is played in various ways. Usually the dominoes are shuffled about, spots downward. Each player draws a number agreed upon. The highest double is then played. The players follow in turn, each matching the end of a piece that does not join any other. If a four and a two are exposed, for instance, the player may match either. If he plays a two and a six, his successor must then play a four or a six. If a player is unable to match either end he must draw from the table until he succeeds in doing so. The player whose pieces are all placed first wins by the number of spots still held by his opponent or opponents. If neither player can match, and the extra dominoes have all been drawn, the game is blocked. The player having the fewest number of spots wins. The game is not without arithmetical value for young children. Even older persons find recreation in playing it. See Games.

Donatello, dōn-ä-tĕl'lō. See Marble Faun, The.

Donizetti, Gaetano (1797-1848), an Italian operatic composer whose operas in his own language and in French, though carelessly written, are delightfully melodious and dramatically effective. He was born at Bergamo, and studied there and in Bologna. His first opera, *Enrico de Borgogna,* was produced at Venice. Success attended Donizetti, and he thereafter wrote 63 more operas. His skill in writing for the voice was remarkable, but rapidity of production detracted from the merit of his work. His most important operas are *Lucia di Lammermoor; Don Pasquale,* a

comic opera; and the sparkling operetta, *La Fille du Regiment.*

Don Quixote, kwĭks′ōt, Spanish dōn kē-hō′ta, a novel by Miguel Cervantes. It was published in two parts, in 1605 and 1615 respectively. The book was a burlesque on the popular tales of chivalry. The first part met with immediate success. Five editions were printed within a year. Cervantes, who regarded Don Quixote as of minor importance to his dramas, postponed writing the second part for some time. When he finally began it he had lost interest, and wrote in a half-hearted fashion until some one else published a spurious second part. This enraged Cervantes, and the book was finished forthwith. It was never so popular as the earlier part of the work, although quite equal to it in humor, vivacity, and invention, and surpassing it in literary execution. It is said that *Don Quixote* has found more readers than almost any other work of fiction. Up to 1874, 278 editions had appeared, 81 of these in Spain, 191 in other countries.

To appreciate fully the humor of *Don Quixote* it is needful to know something of the region through which the gallant Don rode in search of adventure. La Mancha is the name of the district, and it is the dullest and most unattractive region in all Spain. "The landscape of La Mancha has the sameness of a desert without its dignity." The few poor villages are utterly lacking in the picturesque and romantic. Altogether no place could have been chosen to make more ridiculous the exploiting of knight errantry. "Don Quixote himself is always a misfit." His imagination clothes the most commonplace circumstances with romance, and his thirst for adventure is only equaled by his propensity for getting into ludicrous difficulties. After all, there is something about the character of Don Quixote that we like, and that wins our sympathy and almost our admiration. He is at least brave, honest, and boyish. Sancho Panza, Don Quixote's squire, is simple and faithful. He is as devoid of imagination as his master is full of it. The contrast between the two adds charm to the picture.

See CERVANTES.

SAYINGS.

Murder will out.

As ill luck would have it.

Let us make hay while the sun shines.

You cannot eat your cake and have your cake.

A bird in the hand is worth two in the bush.

I never thrust my nose into other men's porridge.

I drink when I have occasion, and sometimes when I have no occasion.

A little in one's own pocket is better than much in another man's purse.

I can tell where my own shoe pinches me; and you must not think, sir, to catch old birds with chaff.

Many count their chickens before they are hatched; and where they expect bacon, meet with broken bones.

CRITICISMS.

Don Quixote and Sancho Panza are "two of the most notable creations in all fiction, whose adventures have given multitudes pleasure in the past, and which will give still greater multitudes pleasure in the future."

Probably no book except the Bible has exceeded *Don Quixote* in the number of translations into foreign languages and the multiplicity of editions.

Don Quixote came into being as a protest against the unreality of the novels of chivalry which at that time were so popular that they were apparently having a marked effect on the national life and turning the people into a race of sentimentalists. An old writer says that it was "next to impossible to walk the streets with any delight or without danger, so many cavaliers were prancing and curvetting before the windows of their mistresses." It was a wholly unnatural and theatrical revival of knight-errantry. But, with the appearance of *Don Quixote,* playing the gallant after this manner took on a new aspect. The person who did so was twitted by high and low, and these fantastic love scenes became things of the past, while the novels that inspired them went out of fashion.—Clifton Johnson.

Don Quixote is the book of humanity.—Sainte-Beuve.

In one sense *Don Quixote* is a satire; but the follies it ridicules are those common to all humanity and to every age, and the satire is of that rare kind which moves not to depreciation, but to love and pity of the object—to sympathy rather than to contempt, and to tears as well as laughter. . . . So this burlesque of romance has become a real picture of life—this caricature of chivalry the truest chivalric model—this life of a fool the wisest of books.—Watts.

No doubt Cervantes at first proposed to himself a parody of the romances of chivalry, but his genius soon broke away from the leading strings of a plot that denied free scope to his deeper conception of life and men.—Lowell.

Don Quixote, with all its unquenchable and irresistible humor, its bright views and its cheerful trust in goodness and virtue, was written in Cervantes' old age, at the conclusion of a life which had been marked at nearly every step with struggle, disappointment, and calamity; it was begun in prison, and finished when he felt the hand of death pressing cold and heavy upon his heart.—Botta.

Doomsday Book, the record of an official survey of England made during the reign of William the Conqueror. The origin of the name is in dispute. It is connected by tradition with the tyranny of the Norman nobles. As studied nowadays, it appears to be a very systematic record of the ownership and occupancy of land. The names of owners and renters are set down, together with the extent of land occupied by each. Other items were the number of acres under tillage, in pasture, in meadow, or in forest, together with the number and kind of domestic animals. The Anglo-Saxon *Chronicle* says: "So very straitly did he cause the survey to be made, that there was not a single hyde, nor a yardland of ground, nor—it is shameful to say what he thought no shame to do—was there an ox or a cow or a pig passed by, and that was not down in the accounts, and then all these writings were brought to him." At all events, the Doomsday Book became the official register of land ownership. It covers the greater part of England. In that country land titles start with the Doomsday Book. The original is still preserved in the government archives at London. See WILLIAM THE CONQUEROR; RECORD OFFICE.

Doré do-rā, **Paul Gustave** (1833-1883), a noted French illustrator of books. He was born at Strasburg. He received his education, lived, and died in Paris. His illustrations of the *Bible,* of Dante's *Inferno,* Milton's *Paradise Lost,* Tennyson's *Idylls of the King,* and Cervantes' *Don Quixote* have made him famous. He is not unknown as a painter, but in this department his fame is quite secondary. Doré was decorated with the cross of the Legion of Honor in 1861.

Dorians, one of the four great branches of the Greek race. The Spartans were the chief Dorian representatives. In achievement, the Dorians were second only to the Ionians. The Dorians were considered a plain, rude, blunt people, possessing character and strength. The Spartans were less lively than the Athenians, and did not equal them in music or literature. They developed the Doric type of architecture, the most noble and the simplest style of architecture the world has ever known. See GREECE.

Dorion, Sir Antoine Aimé (1818-1891), a noted Canadian jurist and statesman, one of the strongest public figures of the period preceding confederation, and for years the spokesman of the radical element in the French-Canadian Liberal Party. He was born at Sainte Anne de la Perade, and educated at Nicolet College. Called to the bar in 1842 he sat in the Legislative Assembly of the Province of Lower Canada from 1862 to 1867. After confederation Sir Antoine was a member of the Dominion Parliament from 1867 to 1874. In 1858 he was Commissioner of Crown lands, and was the French-Canadian Minister in the famous Brown-Dorion Ministry, which lived for only four days. In 1859 Sir Antoine helped to begin the movement for the federation of Upper and Lower Canada. He was appointed Minister of Justice in 1873. He resigned in 1874, and became Chief Justice of Quebec, serving until 1887.

Dorr, Thomas Wilson (1805-1854), a Rhode Island politician and lawyer. He was a member of the Rhode Island Assembly from 1833-37. He was the leader of the people in a demand for a reform in the state constitution, which had remained unchanged from 1663. Only property holders could vote. Some of the older and smaller towns had more representatives in the legislature than the newer towns having several times their population. Failing to induce the privileged classes who were in power to grant the desired changes, Dorr organized an uprising known in American history as Dorr's Rebellion. It finally assumed such proportions that the United States government interfered and sent a force to suppress him. He was arrested, convicted of treason, and sentenced to life imprisonment. He was pardoned, however,

and died soon afterward a natural death, but not before he had lived to see the desired reforms carried into execution. Without doubt he was a patriotic man of excellent intentions.

Dotheboys (do-the-boys) **Hall,** in Dickens' *Nicholas Nickleby,* a school for boys, located in Yorkshire. Of the twenty-eight schools described by Dickens in his various stories none is better known than Dotheboys Hall. Moreover there is no type of school which stood more in need of reform. The schoolmaster is Mr. Squeers, a coarse, brutal, ignorant, self-satisfied man, who not only starves, neglects, and abuses his pupils, but whose methods of giving instruction are so absurd as to be laughable, were not the whole picture so pitiful that amusement is lost in indignation. The boys on certain mornings were dosed with treacle and brimstone,—"To purify their bloods," said Mr. Squeers. "Purify fiddlesticks ends," said his lady. . . . "It spoils their appetites, and comes cheaper than breakfast and dinner."

The breakfast that follows the medicine is "a brown composition which looked like diluted pincushions without the covers, and was called porridge." The pupils are supplied with "one book to eight learners." Mr. Squeers explains his method of instructing the class in "English spelling and philosophy." "We go upon the practical mode of teaching; the regular education system. C-l-e-a-n, clean, verb active, to make bright, scour. W-i-n, win, d-e-r, der, winder, a casement. When the boy knows this out of a book he goes and does it. It's just the same principle as the use of globes."

That Dickens' picture of Yorkshire schools was not overdrawn and that he purposely aimed to bring about the reform which resulted from his exposure of existing conditions is clearly shown in the preface to the first edition of *Nicholas Nickleby,* from which the following is taken:

> It has afforded the author great amusement and satisfaction, during the progress of this work, to learn, from country friends and from a variety of ludicrous statements concerning himself in provincial newspapers, that more than one Yorkshire schoolmaster lays claim to being the original of Mr. Squeers. One worthy, he has reason to believe, has actually consulted authorities learned in the law, as to his having good grounds on which to rest an action for libel. . . . The author's object in calling public attention to the system would be very imperfectly fulfilled, if he did not state now, in his own person, emphatically and earnestly, that Mr. Squeers and his school are faint and feeble pictures of an existing reality, purposely subdued and kept down, lest they should be deemed impossible—that there are, upon record, trials at law in which damages have been sought as a poor recompense for lasting agonies and disfigurements inflicted upon children by the treatment of the master in these places, involving such offensive and foul details of neglect, cruelty, and disease, as no writer of fiction would have the boldness to imagine.

Douay, dōō-a′, or **Douai,** one of the oldest cities in France. It is situated in the northeastern part of France in Calais county. It is a picturesque, odd city, with an old parish church, marketplace, town hall, and belfry. It is noted in history as the refuge of English Catholics. An English-speaking university was maintained here by them. Printing presses afforded facilities for publishing Catholic books in the English language. The Douay Bible, the English Bible of the Catholic church, was published here in 1609. At the time of the French Revolution the college and presses were driven out and were reëstablished near Durham, England.

Double Cloth, a descriptive term applied to textiles produced by uniting two distinct webs during the process of weaving. This is done by interlacing some of the warp threads of one web into the other web at regular intervals, thus fastening them together securely. A variety of double cloth is produced to fulfill various purposes.

Double Stars, the general name applied to stars which to the naked eye appear as single units, but which the telescope resolves into doubles. Astronomers further differentiate these stars as "optical doubles" and "binary doubles." The first are two stars which from their positions in the sky appear to be physically united, while the second really have a physical connection and revolve about a common center—the center of gravity of the combined mass of the two stars. Something like 20,000 double stars have been catalogued.

Doughty, Arthur George (1860-), a Canadian archivist and historian, Dominion Keeper of Public Records and Director of War Trophies. Born at Maidenhead, Berkshire, England, Mr. Doughty was educated at Eton and at Oxford, and removed to Canada in 1886. He entered the service of the Legal and Commercial Exchange, Montreal, and in 1897 became private secretary to the Minister of Public Works, Quebec. From 1901 to 1904 Mr. Doughty was joint librarian to the Quebec Legislature, and in the latter year was appointed Dominion Archivist at Ottawa. In 1909 he was appointed a member of the Geographic Board of Canada; attached to the War Archives Survey in 1917; and in 1919 was staff historian on the Canadian tour of the Prince of Wales. Mr. Doughty is the author of a number of historical works, among which are *The Fortress of Quebec; Cradle of New France; Quebec Under Two Flags; The Siege of Quebec and the Battle of the Plains of Abraham; Life and Works of Tennyson;* and *Canada and Its Provinces,* in collaboration with Professor Shortt.

Doubting Castle, in Bunyan's *Pilgrim's Progress,* the castle where Christian and Hopeful are imprisoned by Giant Despair. They escaped by means of the key called Promise. It is frequently said of one who is in a state of irresolution and apprehension, from which hopeful determination would free him, that he is in Doubting Castle. See BUNYAN.

Dougherty, Dennis J. (1865-), Roman Catholic Archbishop of Philadelphia. He was elevated to the College of Cardinals in March, 1921. Cardinal Dougherty was born in Pennsylvania, and educated at the American College at Rome. He taught for several years in St. Charles Seminary, at Overbrook, Pa. In 1903, he was appointed a bishop and served in that capacity in the Philippines and in Buffalo, N .Y., until 1918, when he was appointed archbishop of Philadelphia.

Douglas, dug'las, a famous family of soldiers and landowners—one of the oldest and most powerful families in Scotland. A countryside proverb still runs:

So many, so good as of the Douglases have been,
Of one surname in Scotland never yet were seen.

The name means dark water. There were two branches of the family. The older branch styled themselves the Black Douglases; the younger the Red Douglases. For centuries border mothers hushed their children to sleep with this lullaby:

Hush ye, hush ye, little pet ye,
The Black Douglas shall not get ye.

Of the many Douglases, Sir James the Good fought seventy skirmishes in behalf of Robert Bruce. He was slain by the Saracens while on his way to the Holy Land bearing the heart of Bruce to bury it in the sacred soil of Palestine. In this way the Douglas family added a bloody heart to the family coat-of-arms.

Another notable Douglas was Archibald, Bell-the-Cat, fifth Earl of Angus. His nickname came in an odd way. A number of noblemen were planning measures to get rid of one of the king's favorites whom they all feared and hated. Several methods were proposed, but no one seemed anxious to sacrifice himself to carry out a plan. One of those present said the situation reminded him of the fabled convention of mice. All agreed that a bell should be hung on the cat's neck to give notice of her coming, but no one seemed willing to hang the bell. "I will bell the cat," thundered Archibald, and he did. He slew the wretch in the king's own presence in Stirling Castle. After old Archibald became unfitted for war, his two sons fell in the battle of Flodden and he died broken-hearted. See FLODDEN HILL.

Douglas, Stephen Arnold (1813-1861), an American statesman. He was a native of Vermont. His father died when he was a mere child. His mother was left in needy circumstances. As soon as he was old enough he worked at the trade of cabinetmaker. His education never extended beyond the limits of an academy. He studied law and was admitted to practice in the state of Illinois in 1834. In politics he was an adherent of Andrew Jackson and soon became leader of the Western democracy. He was a man of small stature and great intellect, with remarkable

oratorical ability. He was early dubbed "the little giant," a term which supporters and opponents insisted on giving him during the rest of his life. He rose rapidly from one position to another. His fame rests, however, on his services in Congress. He was a firm supporter of Henry Clay in the compromise measures by which that great leader strove to reconcile the conflicting opinions of the North and South. Douglas became known as the father of the doctrine of squatter sovereignty. In 1854 a committee of which he was chairman, brought in the famous Kansas-Nebraska bill, which proposed to leave the inhabitants of Kansas and Nebraska free to adopt slavery by a popular vote. As this bill repealed the Missouri Compromise of 1820, Douglas was bitterly assailed by many of his former friends in the North. He was a candidate repeatedly for the Democratic nomination for the presidency, but was passed by in 1852 for Franklin Pierce; and again in 1856 for Buchanan. He and Lincoln were political opponents for many a year. In 1858 they canvassed the state of Illinois together, the prize being the United States senatorship. The author of *The Crisis* has described the skillful way in which Lincoln led Douglas into utterances on the subject of slavery—pitfalls that subsequently brought about his political downfall. In 1860 Douglas was nominated for president by a branch of the Democracy, but was defeated by Lincoln. He lived long enough to witness the outbreak of the Civil War, and to give Lincoln hearty support. Among his last public utterances was a notable one to the effect that the war at hand permitted no neutrals. He died at Chicago. See LINCOLN.

Mourning dove.

Douglass, Frederick (1817-1895), a noted lecturer and writer. He was born at Tuckahoe, Maryland, and died at Washington, D. C. His father was a white man, his mother a negro slave. As a child he had a great thirst for learning. While employed in a shipyard near Baltimore he picked up the letters of the alphabet and a number of words from the chalk marks on the various timbers. Later a white woman taught him to read. Among the interesting incidents related in his story of *My Bondage and Freedom,* is that of his experience with a noted trainer, named Covey, to whom he was hired out in order that his spirit might be broken into obedience. He overcame Covey in a hand to hand conflict in the barnyard. His life was saved by the fact that Covey was afraid to let the facts be known, lest his reputation as a disciplinarian might be destroyed. Douglass finally escaped to the North. He was received by the anti-slavery leaders, and soon developed ability as a writer of anti-slavery articles and as an effective lecturer on the anti-slavery platform. He visited England and Canada, stirring up sentiment against the enslavement of his people. In 1870 he

started a paper called the *New National Era.* From time to time he held several positions under the national government. His features were intelligent. His associations were chiefly with white people. He can hardly be regarded as a worker among his own people of the Booker T. Washington type. See NEGRO.

Dove, a bird not readily distinguished from the pigeon. The most prominent American species is the common mourning dove. It breeds from Cuba to Manitoba, and winters from the Ohio River southward. This dove is about twelve inches long, colored much like a wild pigeon. The name comes from the peculiarly sweet, mournful, cooing call of the male which corresponds to the drumming of the partridge and the booming of the grouse. "The soft, melancholy cooing of the mourning dove, whose voice," says Roosevelt, "always seems far away, expresses more than any other sound in nature the sadness of gentle, hopeless, never-ending grief." The dove seems quite at home in the small groves of farmsteads. It builds a careless, flat nest of loose twigs at the end of a spreading branch from five to fifteen feet above the ground. Eggs, two, beautifully white, about an inch long. An examination of the stomachs of several mourning doves showed that their food consisted of seeds of sorrel, spurge, ragweed, sunflower, pigeon-grass, violet, smartweed, buckwheat, and wheat.

The dove of history is necessarily an Old World species. It is the emblem of innocence and gentle affection. Noah sent a dove forth from the ark to see whether the waters were abated. The turtledove was offered by the Israelite as a burnt offering. King David exclaimed, "Oh, that I had wings like a dove! for then I would fly away, and be at rest. Then I would fly away and remain in the wilderness." Christ, it will be remembered, overthrew "the seats of them that sold doves" in the temple. In ecclesiastical art, the dove is the symbol of the Holy Ghost. In Matthew iii:16, we find "Lo, the Spirit of God descending like a dove and lighting upon him." In heraldry the dove bearing an olive branch is the emblem of peace.

See PIGEON.

Dover, the capital city of Delaware, situated on Jones Creek, forty-eight miles south of Wilmington. Dover is in a fruit-growing region, and the canning and packing of fruits and vegetables are its chief industries. There are also saw-mills, machine-shops, foundries, and carriage factories. The State College for Colored Students, and the Wilmington Methodist Episcopal Conference Academy are located at Dover. Other structures of interest are the state capitol building, connected with which is a state library of 50,000 volumes, the county courthouse, the postoffice, a United States Government building, and handsome monuments to two distinguished citizens, Caesar Rodney, one of the signers of the Declaration of Independence, and Col. John Haslett, who lost his life in the Revolution. Population, 1920, 4,042.

Dover, a city of England. It is situated sixty-six miles southeast of London, on the point of land nearest to the French coast. The corresponding French port is Calais, twenty-three and one-half miles distant. A line of steam ferryboats transports passengers, mails, and baggage between the respective railway stations, through which there is a stream of traffic continually.

Important changes have taken place in Dover within recent years. In 1921 the municipal boundaries were extended so as to include an area of 70 acres to be used for housing purposes. A new postoffice has been built, as well as two new churches, the Charlton Church and St. Barnabas Church. Another improvement is the so-called Dover harbor scheme, which includes the reclamation of land, the construction of piers and a breakwater, new bridges, and an enclosed wet-dock to have an area of 21 acres, a depth of 34 feet and an entrance lock 100 feet wide. Most of these projects have been completed. Important to Dover's industrial life was the opening of the Kent coal field.

A large amount of preservative and restoration work has been done at Dover on the ancient Roman and Norman fortifications. Within a recent period many tiles have been found, which indicate Roman occupation and that Dover was the prin-

cipal port to the continent. During the World War Dover was an important naval base. Population, 41,408.

Dover, N. H., eleven miles northwest of Portsmouth on the Cocheco River, was settled in 1623, and is the oldest city in the state. It was a frontier town throughout the seventeenth century and suffered frequently from Indian attacks. The most disastrous of these occurred on June 28, 1689, when 29 people were made captive and 23 were killed. The Cocheco River has falls 30 feet high at Dover and splendid water power for the city's factories is developed. The principal manufactures are cotton and woolen goods, boots and shoes, cutlery, bricks and leather belting. The city has a public library and good public schools. The population in 1920 was 13,029.

Dow, Neal (1804-1897), a noted Prohibitionist. He was born in Portland, Maine, of Quaker ancestry. He was twice mayor of Portland, and twice a member of the legislature. During his first term as mayor he framed a Prohibition bill, carried it to the legislature, and had it passed by both houses and signed by the governor and put in effect,—all inside of three days. It was hastily enacted, but it was not drawn hastily. It is known the world over as "the Maine Law." Mr. Dow served in the Union army as colonel of the Maine volunteers. He was commissioned brigadier-general by President Lincoln. He was captured by the Confederates, and was confined in Libby Prison for eight months, until exchanged for General Fitz-Hugh Lee. Mr. Dow visited England three times on lecture tours. In 1894 he was the Prohibition candidate for president.

Dowie, John Alexander (1847-1907), a religious teacher and organizer whose career is unrivaled in the annals of American religious movements. Born at Edinburgh, Scotland, he began his religious work in Sydney, Australia, where he was ordained a clergyman of the Congregational denomination. After becoming prominent there in politics and social reform, Dr. Dowie took up envangelical work in 1878, convinced that it was wrong to accept a minister's salary. About 1882 he founded a tabernacle at Melbourne, and at the same time announced his doctrine of healing by faith. Emigrating to the United States in 1888 he settled in Chicago, and in a few years his Christian Catholic Church was well known. In 1901 he established his church 42 miles north of Chicago and founded his Zion City. Dr. Dowie called himself "First Apostle of the Lord Jesus the Christ, and General Overseer of the Christian Catholic Apostolic Church in Zion." "Elijah II" was another of his titles. In 1903 Dr. Dowie led his "hosts" eastward to purge the city of New York. In Zion he established a bank, a college, a publishing plant, charitable institutions and a large lace factory. He was deposed in 1906.

Dowler, Bennet (1797-1879) an American physician, was born in Moundsville, West Virginia, and was a graduate of the medical school of the University of Maryland. He removed to New Orleans in 1836, where he edited the *New Orleans Medical and Surgical Journal,* and was the founder of the Academy of Sciences there. He made valuable discoveries in capillary circulation, contractibility, etc. He was the author of a *Tableau of the Yellow Fever of 1853,* and made many experiments concerning this disease.

Downing, Andrew Jackson (1815-1852), the first prominent landscape gardener of America. A native of New York. In 1841 his treatise on the *Theory and Practice of Landscape Gardening* appeared, a book of wide influence. In 1845 *Fruits and Fruit Trees of North America* was issued. He founded the *Horticulturist* at Albany in 1846. In 1851 he visited Europe. On his return he was employed to lay out the public grounds at Washington. On his way from Albany to New York City he lost his life in a steamboat race on the Hudson. Downing's influence is especially valuable on the side of simple, natural grounds. Indirectly he is said to have influenced Frederick Law Olmsted who planned Central Park of New York City.

Doyle, Sir Arthur Conan, an English novelist. He was born in Edinburgh, Scotland, in 1859. He was educated at a Ro-

man Catholic college in Lancashire, and at the University of Edinburgh. He practiced as a physician for a time, but having published several successful stories, he gave over the profession of medicine for literature. Among his best known stories are *Micah Clarke, A Study in Scarlet, The Hound of the Baskervilles, The White Company.* Doyle is most noted, however, for his creation of the character of Sherlock Holmes. *The Adventures of Sherlock Holmes* are a series of detective stories which have been extremely popular. Holmes is represented as an amateur detective of great skill. By scientific knowledge and methods of reasoning, he makes use of the most inconsequential facts to discover remote and surprising causes. He is a cocaine fiend, and is very eccentric, but, withal, so real an individual that his personality makes a lasting impression upon the reader. Aside from the twelve tales in *The Adventures of Sherlock Holmes,* the character of Holmes appears in many other stories, especially in a series entitled *The Return of Sherlock Holmes.* Doyle was knighted in 1902.

Drachenfels, drä′ken-fĕls, or Dragon's Rock, a mountain on the Rhine. It is one of the range known as the Sieben Gebirge, or Seven Mountains. The stone used for Cologne Cathedral and for many other noted buildings was quarried here. The mountain rises abruptly from the river to a height of over 1,000 feet. The cave where the old dragon was wont to live is still pointed out to the traveler. The summit commands a magnificent prospect, including the university town of Bonn in the foreground, and Cologne with its cathedral spires farther down the valley. Byron saw all this with a poet's eye:

> The castled crag of Drachenfels
> Frowns o'er the wide and winding Rhine,
> Whose breast of waters broadly swells
> Between the banks which bear the vine;
> And hills all rich with blossom'd trees,
> And fields which promise corn and wine
> And scatter'd cities crowning these,
> Whose far white walls along them shine,
> Have strew'd a scene which I should see
> With double joy wert thou with me.

Drachma, drăk′mȧ, a Greek unit of value and of weight. The present Grecian coin is worth nineteen and one-half cents in gold. It equals the French franc. The Greeks buy and sell by the drachma's worth, just as we keep accounts in dollars. A member of the Grecian legislature, for instance, is allowed a salary of 1,800 drachmas for the session. The ancient silver drachma varied in value, but corresponded to the Roman denarius. In the day of Demosthenes a fat ox was valued at eighty drachmas and a sheep at ten. The ancient weight known as the drachma was the sixth-thousandth part of a talent—less than one-fourth of an ounce. See Coin; Money.

Draco, an Athenian lawgiver of the seventh century B. C. He was one of the archons or nine chief magistrates, and about 621 B. C. was appointed to draw up a written code of laws, a thing never done before in Athens. It is probable that Draco made no new laws, but compiled and put into definite form the laws that had existed by custom. The "laws of Draco" were engraved on wooden blocks and set up in a public place where all might see them. They were very severe, almost every offense being made punishable by death. It is said of them that they were "written in blood." Draco's laws remained in force until 594 B. C. when Solon replaced them with a milder code. Laws which are especially severe are often spoken of as draconic or draconian laws. See Solon.

Draft, in money transactions, an order drawn by one person upon another for the payment of money to a third. As commonly used, a draft is an order from one bank on another to pay money to the person named in the draft. It differs from a check in that the order is drawn in the name of the bank, instead of the name of an individual, or other business corporation. An individual wishing to transmit money to another may, if he has a deposit at a bank, write a personal check, or, if he has no deposit, he may purchase for a small sum in excess of the amount he wishes to send, a bank draft, or bill of exchange. This the receiver may cash at the bank on which it is drawn.

Dragon, a fabulous animal of monstrous size and fierceness. As represented

in ancient art it is not unlike a winged crocodile; in heraldry it is a nondescript quadruped with fierce claws, large armed wings, a crested head, fiery eyes, and an open mouth, usually spouting fire. In legends the dragon is a fiery monster guarding a treasure, as the Golden Fleece, or the Garden of the Hesperides. The idea or modern notion most nearly approaching the dragon is possibly the popular conception of the devil, "who goeth about as a roaring lion, seeking whom he may devour." Spenser speaks of the dragon "stretched like a great hill." Among Christian traditions, that of St. George and the Dragon is one of the most noted. The dragon, which is regarded in China as a sort of divinity, has been made that nation's imperial emblem. The figure appears on the Chinese flag.

Dragon Fly, one of the most noticeable insects. Its wings look like woven threads of iridescent glass; its eyes like beads of gold. Also called mosquito hawk and devil's darning needle,—the former name from its habit of catching mosquitoes on the wing; the latter, from the elongated shape of its body. Two pairs of strong wings stand at right angles to the body and are seldom folded. This insect can fly backward and forward without turning—something no bird can do. Dragon flies are seen wherever there are mosquitoes to catch, but especially over meadows and stagnant water. The female lays her eggs on the surface of the water. The nymph (see article on INSECTS) is a fine swimmer and lives on such insects as it can catch until grown. It then climbs the stem of an aquatic plant, bursts its last nymph skin, and comes out a dragon fly, leaving the empty coat clinging to the plant. The dragon fly is perfectly harmless.

Today I saw the dragon-fly
Come from the wells where he did lie.
An inner impulse rent the veil
Of his old husk; from head to tail
Came out clear plates of sapphire mail.
He dried his wings: like gauze they grew;
Through crofts and pastures wet with dew,
A living flash of light he flew. —Tennyson.

Drainage, a method of relieving the soil of surplus water. The method of withdrawing water by open surface ditches or drains is too well known to require discussion. Surface ditches are open to objections. They fill up and must be redug. They are in the way of the farmer's team and implements, and they withdraw land from cultivation. In the older countries, where labor is cheap and land is expensive, tile draining is resorted to. Circular sections of earthenware tiling, shaped like joints of stovepipe, but with much thicker walls, are laid end to end in ditches, and covered with earth again. Such drains, if carefully constructed, last for generations without renewal. They must be laid, however, deep enough to be beyond the reach of tools, or possible pressure from the feet of animals or heavy machinery. A tile drain is supposed to draw the water from a strip of land the width of which is from five to twenty times the depth of the drain, according to the nature of the soil. A drain three feet below the surface of a stiff, heavy clay will drain a strip of ground about fifteen feet in width. A similar drain four feet beneath the surface of sandy soil is quite sufficient for a strip forty, or even eighty feet wide.

The utility of drainage is readily understood. Under favorable conditions, the roots of field crops descend from two to five or even fifteen feet, but never below the level of standing water. Changes from day to day in atmospheric pressure cause the surface of the earth to breathe. When atmospheric pressure increases a little more air enters the surface. When the pressure is less part of the air leaves the earth. This breathing extends down only to the level of standing water, and marks the limit to which root growth descends. For this simple reason drainage is of great benefit to crop growers. There is no danger of the earth becoming too dry; for the soil, however well drained, acts like a sponge, raising as much water from great depths as is needed for ordinary purposes of cultivation. Care must be taken, of course, to give the entire line of pipes a pitch in the same direction, and to provide a free outlet at the lower end.

Drake, Sir Francis (1539-1595), an English navigator. He is one of the great

captains whose exploits brought renown upon the reign of Queen Elizabeth, and gave England command of the ocean. He was a native of Devonshire, but his boyhood was spent among sailors. As a lad he made numerous voyages to France and the Netherlands. In 1570 he was sent to the West Indies in command of a small fleet. He enriched himself and his queen with the plunder of Spanish ships. The queen was so delighted with his exploits that seven years later she sent him out again with five vessels. This time he roved along both coasts of South America, crossed the Pacific Ocean, and returned home by way of the Cape of Good Hope, his vessel laden with treasure plundered from the Spaniards. In 1587 Spain was making ready her famous Armada. Drake was dispatched with a fleet to do as much damage as possible. He entered the harbor of Cadiz with thirty sail, destroyed a hundred Spanish vessels, captured a number of returning merchantmen, and returned home as before with an immense amount of gold and silver. This exploit he termed "singeing the king of Spain's beard." During Lord Howard's encounter with the famous Armada in the English Channel, Drake gave a good account of himself. From the Spanish point of view Drake was a wild sea rover,—a pirate who plundered ships for the sake of their gold and silver; but in the eye of England, he was a bold naval commander who struck terror into the hearts of her enemies and brought home great treasure. He died finally at sea and was buried in the ocean. A chair made from some timbers of his ship, the Golden Hind, in which he circumnavigated the world, was presented to Oxford University, where it may still be seen.

Who is that short, sturdy, plainly dressed man who stands with legs a little apart and hands behind his back, looking up with keen gray eyes into the face of each speaker? His cap is in his hands, so you can see the bullet head of crisp brown hair and the wrinkled forehead, as well as the high cheek bones, the short square face, the broad temples, the thick lips, which are yet as firm as granite. A coarse, plebeian stamp of man; yet the whole figure and attitude are that of boundless determination, self-possession, energy; and when at last he speaks a few blunt words, all eyes are turned respectfully upon him,—for his name is Francis Drake.—Charles Kingsley.

Drake, Joseph Rodman (1795-1820), an American poet. Born in New York City. The poet was distantly related to the admiral of that name. At the age of five he was a famous hand to get up conundrums. Having been banished to the attic one day for some offense, his sister started upstairs to see how the little seven-year-old was getting on and found him pacing the floor with a make-believe sword on his shoulder, guarding a heap of rubbish, and pretending that he was Don Quixote guarding his armor in the church. Drake tried clerking and then studied medicine. One sunny afternoon Drake and Fitz-Greene Halleck were sailing with a friend on New York Bay, when a slight shower came up and a rainbow spanned the sky. Halleck made the remark that "It would be heaven to lounge on a rainbow and read Tom Campbell." This brought Drake and Halleck together, and they became famous chums. They wrote a series of witty poems for the New York *Evening Post* over the signature of Croaker & Co. or Croaker, Jr. Drake's fame rests chiefly on an exquisite poem, the *Culprit Fay*. This poem was written in three days, in the heat of an argument with Halleck and Cooper, to prove that a fairy tale may be made to grow out of American soil. The *American Flag* is considered Drake's best shorter poem. It begins with the familiar lines:

When Freedom from her mountain height
  Unfurled her standard to the air,
She tore the azure robe of night,
  And set the stars of glory there, etc.

At Drake's death, Halleck wrote a beautiful poem from which the following stanza is often quoted:

Green be the turf above thee,
  Friend of my better days!
None knew thee but to love thee,
  Nor named thee but to praise.

Drama, a story designed to be told by actors. The very word drama means action. The characters of the story are supposed to be represented by real persons who imitate them in voice, gesture, dress, manners, and actions. Any number of ac-

tors may be introduced. In a dialogue the two participants remain in the same frame of mind throughout; but in the drama the actors change their minds as events develop, as is the case in the actual life which they are attempting to depict.

Man is naturally imitative. He naturally gives expression by voice and gesture to his emotions and conceptions. The assumption of character by dress and decoration seems also a natural desire. A child likes to "dress up" and play he is some one else. Nations in their childhood did the same. This is a preliminary step toward the drama, which imitates action as well as appearance and manner. Dramatic performances of some kind have been known doubtless among all nations, although comparatively few possess anything that may be called dramatic literature.

The earliest forms of drama have been connected in some way with religious rites. In the early drama poetry was invariably the vehicle of expression. In modern times prose is permissible. The history of literature shows that dramatic poetry forms one of the three great classes of poetry, the others being epic and lyric. In their development epic verse and lyric verse precede dramatic, as song, gesture, and speech precede the imitation of action.

The drama is commonly divided into two great classes, tragedy and comedy. The former presents the serious problems of life,—such characters, deeds, and circumstances as lead to a fatal issue. Comedy presents the humorous and happy side of life. If misfortune and trouble are introduced, they are only temporary. It may be noted that, in form, tragedy is the more largely concerned with action; comedy depending more upon sprightly conversation for its effects. From combinations of tragedy and comedy result the minor forms of drama, tragi-comedy, melodrama, farce, grand opera, opera bouffe and burletta. Closet drama is a term used to designate a literary production dramatic in form, but not suited for presentation on the stage. Tennyson's *Queen Mary* and Longfellow's *The Spanish Student* are examples of the closet drama.

The most interesting ancient dramatic literature, and the most important on account of its influence, is that of Greece. Both forms of Grecian drama, tragedy and comedy, had their origin in the religious festivals held in honor of Bacchus. The earliest examples are no longer extant; but the credit for the first drama, a tragedy, is given to Thespis, who lived in the sixth century before Christ. It must not be understood that Thespis wrote anything like a complete drama. He simply introduced a monologue, or possibly a dialogue, into the choruses sung at the Bacchanalian festivals. This was, however, the beginning, and Thespis is called the founder of the drama. Dramatic art is known also as the Thespian art.

Among Greek writers of the drama, three names stand out prominently,—those of Aeschylus, Sophocles, and Euripides,—all writers of tragedy. Of these, Aeschylus is the earliest and the greatest. Three laws, the "unities," were obeyed rigidly in the composition and presentation of these dramas. They were the unity of place, which meant that the entire action must take place in the same locality; the unity of time, meaning that the action must be confined to one day; the unity of plot or action, meaning that no minor plot shall be admitted, but every incident and speech must be subordinate to the main argument.

Besides the "unities," other limitations restricted the Greek dramatist. His work must be in poetry, and poetry of an intricate and difficult meter. His subjects were limited to mythology and tradition, with occasionally some slight addition of contemporary events. In spite of these strict laws, the tragedies of Aeschylus are of a high order, both in respect to poetic quality and dramatic power. In conformity to the "unity of place," it will be seen that the Greek play must be presented in one act. Another drama might be presented immediately following the first. Sometimes three were written to be given consecutively. The series was then called a trilogy. In Grecian comedy, Aristophanes and Menander are the most noted names.

The Romans added little of importance to dramatic literature. Terence and Plautus

produced comedies after Greek models. The only Roman tragedies extant are those ascribed to Seneca, which seem to be more properly closet drama than the work of a playwright. The Roman theater, however, was the first to divide the drama into acts. Horace states that the number of acts required in a work of art is five.

In the early centuries of the Christian era the drama made no advancement. The only dramatic literature produced was that of Roswitha, a German nun, who is credited with a number of comedies in the style of Terence. When the drama again comes into prominence, it is in connection with religious rites. The presentations were called Mysteries or Miracle Plays, and the subjects were taken from the Bible, or the legends of saints. The home of this form of drama was France, although it extended to other countries. As early as the thirteenth century a French author, named Halle, had produced something very closely akin to modern comedy; and by the fourteenth century France had introduced both the "profane mystery," a play dealing with current events, and the "morality play," an allegorical play.

Under the influence of the Renaissance, French drama, especially tragedy, seems to have undergone a complete revolution. The dramas of Seneca became, and remained for many years, the model. Corneille, regarded as the "liberator of French thought and literary expression," began his great work in 1635 with *Le Cid*. To Corneille, Racine, Molière, and, in a lesser degree, to their followers, is due the fact that both "comedy and tragedy now assumed shapes which France long retained unaltered, and which for a time gave law and pattern to all Europe except England, and even to some extent there." About 1830 the French tragedy was again revolutionized by the "romantic movement," with Victor Hugo and the elder Dumas as its leaders. Comedy, too, underwent decided changes. Dumas the Younger, Sardou, and De Musset are other French dramatists of modern times.

Spain is said to be the "only country of modern Europe which shares with England the honor of having achieved, at a relatively early date, the creation of a genuinely national form of the regular drama." Lope de Rueda is regarded as the founder of Spanish drama. He gave it permanent form. The name of Calderon stands high as a poet, if below that of Vega as a dramatist. Many of the early Spanish dramas were of a religious character; many are classed as "romantic" dramas; while the most distinctively Spanish are those which satirize fashionable life and intrigue. Lowell says, "The national genius triumphed over traditional criterions of art and the Spanish theatre, asserting its own happier instincts, became and continued Spanish, with an unspeakable charm and flavor of its own."

Germany has contributed less to the European drama than any other great literary nation. Yet one of the greatest dramas, *Faust,* is the work of a German, Goethe. It has been said that *Faust, Hamlet,* and the *Book of Job* are the world's greatest three dramas. The Germans, moreover, have cultivated the art of acting, and have added much to dramatic criticism and development of the theory of the stage. Lessing, who is regarded as authority on dramatic theory, produced several dramas, *Minna von Barnhelm* and *Nathan der Weise* being two of the best known. Schiller's *Wallenstein's Leben und Tod* and Goethe's *Egmont* are other popular German dramas.

Among Scandinavian nations, the Norwegians, Björnson and Ibsen, have written plays dealing with social problems.

In England, the drama was late in taking definite form. The miracle plays were popular here. Several collections of these, as those of Chester, Coventry, and Townley, have been preserved. From the beginning of the sixteenth century we find the drama making progress. There is more variety in the mystery plays. Morality plays, in which vice and virtues are personified, appear. Interludes, introducing and satirizing current events, also add to the variety. In the latter part of this century England's great and original school of dramatists, the Elizabethan, arose. As forerunners of this school we find the names of Udall, Still, and Sackville. Udall

produced the first English comedy in 1540. Still wrote a comedy, and Sackville the first English tragedy. Then almost suddenly appear the University group, as they were called,—Marlowe, Green, Peele, and Lyly, following no foreign model, but making the beginnings of true English tragedy.

Shakespeare, the greatest dramatist of modern times, many would say the greatest the world has ever seen, produced his first play, *Love's Labor Lost,* about 1589. With Shakespeare, as belonging to the Elizabethan period, must be mentioned Ben Jonson, Chapman, Beaumont and Fletcher, Massinger and Ford, Webster, Middleton, Dekker, and Shirley. The work of this school closed with the death of Shirley, 1666.

After the Restoration we find great changes. Influenced by the French drama, as well as by Cromwell's love of music, a musical drama was introduced, followed by what are called "heroic" plays, the noticeable characteristic of which is that they employ the rhymed couplet. For twenty years these held the stage, Dryden's name being most prominent among authors of this class of drama. Dryden, however, finally returned to the blank verse of the earlier drama, and his examples of tragedy in that form are the last pure English tragedy.

Comedy, however, did not share the fate of tragedy. The influence of the French Molière, of Jonson, and of Fletcher of the preceding century, shows itself here. Congreve, Wycherley, Vanburgh, and Farquhar produced many successful comedies. An attack on the indecency of the stage by Jeremy Collier about this time had effect. A little later, the names of Goldsmith and Sheridan appear as writers of comedy.

Until very recently, as the history of the drama is reckoned, America produced no real dramatists, perhaps for the reason that there was no cultural background for great native drama. The American theatre was forced to draw upon Europe for its productions until about 1900, when American dramatists began to attract attention wih works disinctively American in flavor and setting. The most notable of the Americans are James Forbes, David Belasco, Edward Sheldon, Eugene O'Neill, Langdon Mitchell and Booth Tarkington.

The drama's laws, the drama's patrons give
For we that live to please must please to live.
—Dr. Johnson.

The ages and circumstances in which drama has flourished must have been those in which it occupied for a time, and sometimes almost monopolized, the position of public instructor and informer on questions of thought and news, as well as that of public entertainer.—Will Clemens, in *Americana.*

Spain and England alone, among modern civilized nations, possess a theatrical literature independent in its origin, characteristic in its form, and reflecting faithfully the moral, social, and intellectual features of the people among whom it arose.—Shaw.

Dramatical is, as it were, a visible history: for it sets out the image of things as if they were present, and history as if they were past.—Lord Bacon.

A play ought to be a just image of human nature.—Dryden.

Draper, Andrew Sloan (1848-1913), an American educator and college president, His birthplace was Westford, New York. He received his early education at Albany Academy, then studied law at the Albany Law School, and took up its practice in that city. He was for several years a member of the Albany board of education, and in 1882 was appointed to the state normal college board. He won distinction as a member of the New York state assembly and was a judge of the United States Court of Alabama Claims under President Arthur. In 1886 he was made superintendent of public instruction of New York, which position he filled for six years. From this time Mr. Draper's entire attention was given to the cause of education. In 1892 he became superintendent of schools in Cleveland, Ohio, and ten years later was elected president of the University of Illinois. This position he resigned in 1904 to become commissioner of education of the state of New York. Mr. Draper published a number of works on educational subjects, among them *The Organization and Administration of City School Systems, American Schools and American Citizenship, American Universities and the National Life.*

Draughts. See CHECKERS.

Drawing, in a broad sense the art of producing upon a flat surface the likeness of objects or of scenes. In a restricted and more common use of the word, drawing usually includes only such representations as are produced in outline with the shading necessary to develop roundness. In this sense pictures in oil and water-color are not drawings. They are paintings and should be so called.

Of free-hand drawings various classifications or groupings may be made. According to their style, dependent upon the materials used, they are classed as chalk drawings, pen drawings, and wash drawings. The term chalk drawings includes drawings with the lead pencil. Colored chalks are used most commonly. In pastel drawing numerous colored crayons of a fine quality are employed. Pen drawings are often outlines simply. An effect of relief is secured by doubling lines on the shadow side. When finished drawings are produced with the pen, the shading is done by means of combining fine lines. In wash drawings the outlines are sketched in with brush or pencil, and the shading "washed in" with the brush, in India ink, or sepia. Wash drawings and water colors differ in that wash drawings are black and white.

As regards their purpose drawings may be classed as sketches, studies, academic drawings, carbons, and finished drawings. A sketch is supposed to present the chief features only of the scene or object, with no attempt at completeness of detail. A study is a finished drawing of some one part of an object or figure. The sketch offers an opportunity for the display of artistic taste, demanding descrimination in the putting in of some things and the leaving out of others. The study, on the other hand, requires no display of taste in its placement, but shows how carefully and with what accuracy one may work out detail. Academic drawings are those made in art schools and academies from living models or from lay figures. The model may be lighted by natural light or artificially. Lamplight gives stronger contrast of light and shadow than does daylight. A finished drawing, as the term indicates, is one which is complete in every part, as perfect as the artist can make it. The cartoon is described in a special article.

There are few studies which train so many faculties as does drawing. Hand and eye are taught to coöperate with the powers of observation and of memory, while the development of muscle control is no small part of the educational value of thorough training in drawing. That these facts are recognized generally is evidenced by the curriculums of the public schools of nearly all nations, which show drawing as an important feature from the primary grades upward.

The work of a draughtsman or architect who makes plans or diagrams rather than likenesses is distinguished from free-hand drawing by the term mechanical. Mechanical drawing is taught as a special course in high schools and colleges.

Dreadnaught, from the name of a battleship added to the British navy in 1906, a term applied subsequently to a class of war vessels combining superior offensive and defensive powers with speed as great as can be given without serious reduction of these powers. A more recent class of battleships has been called superdreadnaught. The term has been used in both the United States and British navies. The original Dreadnaught, a vessel christened by that name, introduced many changes in battleship design, chief among which was the adoption of a single caliber for its large guns. It was in fact an all-big-gun battleship. The advantages of a single caliber for a naval battery are numerous and important. In fighting at long range, for instance, a ship with twelve large guns is reckoned about three times as powerful as one with only four large guns in her main battery; and a division of four such ships is therefore considered equal to a fleet of twelve ships of former types, and may prove more than equal through greater concentration of force and ease of handling.

The principal dimensions of the original Dreadnaught were: Length, 490 feet; beam, 82 feet; draft, 31 feet. It was equipped with turbine engines, by means of which former battleship speed was in-

creased by 2½ knots and hour. Military masts of the old type were discarded, and among other changes that defied tradition was the one that placed the quarters of the officers forward. The displacement of water was 17,900 tons, or about 3,000 tons more than that of the heaviest battleships that preceded it, and with engines of 23,000 horse-power a speed of approximately 24 miles an hour was attained. The protective armor-plating was 11 inches thick.

While the appearance of the Dreadnaught revolutionized battleship-building to a certain extent on both sides of the Atlantic, subsequent changes made in vessels of the dreadnaught class for the United States Navy have also been important. The single caliber having been accepted for main-battery guns in all the principal navies, the details of armor, gun mounting and speed were solved differently in each country. As far as gun emplacement is concerned, the American system has gradually superseded all others. In this system all the gun turrets are placed on the center line, the second is superimposed, high enough to fire over the first, and one of the after turrets (not the aftermost), is high enough to fire over the others. This brings all guns into each broadside and gives an unobstructed bow and stern fire.

In the later United States dreadnaughts, like the California, twelve 14-inch guns were arranged to fire six ahead, six astern, twelve on each beam. They had direct electric drive, burning oil fuel, and with a superior thickness and arrangement of armor had no superiors at that time.

Dream, a procession of images or fantastic ideas passing through the mind while one is asleep. Roughly speaking, there are three theories of the dream. According to a belief quite prevalent among savage people, the soul or mind leaves the body during sleep and travels abroad in the world of spirit.

A second theory is that of supernatural origin. According to this theory, a dream is a communication from the other world, —a hint which the dreamer does well to interpret and heed with care. In Greek mythology the gods frequently spoke to the heroes in their sleep. At the instigation of Jupiter Aeneas was warned by Mercury in a dream to remain no longer at Carthage. In the scriptural story of Joseph, the dreamer of dreams, we have an excellent illustration of this theory. He dreamed that his brothers' sheaves bowed down to his sheaf, thus forecasting the time when his brethren bowed themselves before the great man of Egypt. The chief butler in prison dreamed that he gave the king to drink again. This actually came to pass. The chief baker dreamed that he carried meats on his head and that the fowls of the air came and ate of them, thus foreshadowing his death. Pharaoh dreamed of the seven fat kine eaten up by the seven lean ones, and of the seven full ears of corn devoured by the seven blasted ears. By interpreting this dream, Joseph was able to foretell the seven years of plenty followed by those of grievous famine.

The third theory of dreams is to the effect that a dream is an action of the mind produced either by some sort of mental excitement, such as trouble, worry, something that one has read, or heard, or seen; or else that the dream arises from some condition of the body, as cold, hunger, or some other form of bodily discomfort. An imaginative child, who has heard or read Indian tales of massacre and burning, not infrequently dreams of passing through similar scenes. The child's sufferings are, for the time, quite as keen as though they were real. Such dreams as trying to run against a strong wind, leaping from a housetop, and the like, are due usually to some uncomfortable position of the body, or to an overloaded stomach. A cold foot may cause one to dream that he is tramping through a snowdrift. Almost everyone dreams, even from the earliest infancy, and can draw upon his own experience for illustrations. They are usually, however, of greater interest to himself than to others.

One of the strangest features of dreaming is the immense amount of experience that is packed within a few moments. Events that would occupy hours of wak-

ing time may be crowded into a few seconds. One falls asleep and dreams of traveling for hours, holding long conversations with various persons, passing through all sorts of adventures and bodily discomforts or pleasures, and awakes to find that he has napped but a moment or two. Some authorities even go so far as to assert that all dreams, however lengthy, take place at the very moment of waking; but there appears to be no solid foundation for this statement.

Dredging, the deepening of channels and harbors by the removal of loose earth. There are two typical kinds of dredging machines. The first consists essentially of a series of buckets, running on an endless chain or belt, such as may be seen in a grain elevator, only on a larger scale. As the buckets pass around the lower pulley, they scoop up earth; as they run over an elevated pulley at the other end of the circuit, they discharge the earth into a scow provided for the purpose of receiving it. Huge dredges of this sort are in use in digging the Panama Canal.

A second sort of dredge consists of a steam shovel, such as is used for loading earth on flat cars. The shovel, which is really a huge, metal scoop, has the size of a barrel. It is swung on a derrick and is worked by steam. It drops to the bottom and scrapes up a load of earth. It is then elevated by means of a chain and ratchet work, and swung around by means of the derrick until in position to discharge its contents through a hinged bottom into a scow as before. Both kinds of dredge are mounted on a flat boat constructed for the purpose. It carries an engine and a supply of fuel. It advances as the work progresses and may be taken from place to place as its services are needed. Still another kind of dredge may be mentioned. A colossal contrivance, used in deepening the channel of the Willamette and Columbia rivers, churns up the soil to be removed and pumps it up like a mosquito, through a forty-inch tube. Mammoth dredges are kept at work constantly in the Suez and other canals.

Dred Scott Decision, a celebrated decision of the United States supreme court. The case occasioned intense excitement at the time. Briefly stated, the facts are as follows. Dred Scott was a negro born in Missouri about 1810. He was the slave of an army surgeon by the name of Dr. Emerson, who took him as a body servant with his regiment, first to Rock Island, Illinois, and in 1836 to Fort Snelling, then in the territory of Iowa, now in Minnesota. At Fort Snelling Dred married Harriet, a slave in the same family, and had two children. Rock Island and Fort Snelling were both in free territory. In 1838 the doctor returned to St. Louis, taking Dred with him. A lawyer, Francis P. Blair, an opponent of slavery, learned of the facts in Dred's case, and encouraged him to bring suit for assault and battery. It was not alleged that he had been subject to especially cruel treatment, only that he had been coerced. The argument of Dred's lawyer was that, by residence in free territory, Dred had become a free man and a citizen of the United States, entitled to the protection of its courts. The contention of the lawyer on the other side was that Dred was a mere chattel, like a horse, incapable of appearing in court, or of being represented by a lawyer. The case was taken from one court to another. A decision was handed down finally by the United States supreme court by a vote of seven to two, on March 6, 1857, giving judgment against Dred, thus deciding practically that an owner could take his slaves into any part of the United States and hold them. In the absence of congressional action to the contrary, this was actually the law of the United States until set aside by the thirteenth constitutional amendment in December 18, 1865. Dred, it may be said in passing, was purchased by friends and given his freedom.

Although the decision led to no colonizing of slaves on free soil, the feeling was intense. Quiet people on both sides of Mason and Dixon's line were set to thinking. The more rabid pro-slavery leaders were jubilant; the anti-slavery leaders were rendered desperate. If acquiesced in, this decision cut the ground completely from under the new Republican party, which had been organized to prevent the

extension of slavery into free territory. If it meant to obey the supreme court decision, the Republican party had no excuse for continued being. Therefore, Lincoln declared that the decision must be changed by a change in the court. With even truer insight, James Russell Lowell wrote, "Have you seen the Dred Scott decision? I am glad. Now we shall see where the stouter lance-shafts are grown, North or South."

See TANEY.

Dresden, drĕz′den, the capital of Saxony. It is situated on the Elbe 387 feet above sea level. It is not without commercial importance. Dresden claims first place among North German cities as an art center. The Dresden picture gallery, fostered by a long line of Saxon princes and prime ministers, ranks, both as to building and contents, with the first galleries in the world. Among other treasures is the priceless *Sistine Madonna.* Were it not that a large part of the people, as in every European city, are in poverty, the galleries, theaters, parks, palaces, and equipages would persuade the tourist that Dresden is a paradise of leisure-loving people. The present population is about 395,000.

Dress. See CLOTHING.

Drew, John (1853-1919), an American actor, who was unexcelled in depicting the comedies of society life. His father was an Irish comedian and his mother a talented actress. He made his first appearance in the Arch Street Theatre, Philadelphia. Three years later he went to New York, where he took prominent parts under Edwin Booth, Fanny Davenport and other stars. From 1875 to 1892, he was leading comedian in Augustin Daly's company. He achieved wide popularity as Petruchio in *Taming the Shrew* and as Charles Surface in *The School for Scandal.* He won success as a star in *A Marriage of Convenience, Richard Carvel, The Liars, The Prodigal Husband, Major Pendennis,* and other plays.

Dreyfus, Alfred, dra′ fus (1809—), an officer of the French army, born in Alsace. He was a member of a wealthy Jewish family, and because of racial prejudice in the army, was made the victim of a cruel conspiracy. In 1894, Dreyfus was accused of selling military information to the German government. He was convicted and sent to a French penal colony off the coast of French Guinea. Later information led to a second trial, at which the sentence was changed to light imprisonment for ten years. There was a general belief that Dreyfus was innocent, and President Loubet pardoned him and set him at liberty. He returned to his estates and set about clearing his name, which he accomplished in 1906, when the Supreme Court declared him innocent of all charges brought against him. His acquittal was a rebuke to military autocracy and it revealed the corruption existing in the French army. Dreyfus was made a member of the Legion of Honor.

Dromedary, drŭm′e-da-ry, a kind of camel. The term is derived from a Greek word meaning a runner. Like our words race-horse and saddle-horse, it has a relative meaning and may be applied to any camel trained to carry riders with speed. More properly, however, the dromedary is a variety of the one-humped Arabian camel noted for lightness of build and fleetness of foot. A well bred dromedary will trot nine miles an hour for a day and a night without signs of distress and, in case of need, can carry a messenger six hundred miles in five days with no other refreshment than a few quarts of water from a leathern water-bag and a few pounds of cake made of barley meal and powdered dates. The natural gait of a dromedary is a swinging trot. Both feet on one side are moved at the same time, then the feet on the other side are swung forward, after the manner of a pacing horse. The jolt is less than that of an ordinary camel; but it is terribly rough, and can be endured only by a practiced rider. If forced from his untiring pace into a gallop, the dromedary is soon exhausted. Consult the opening chapters of Lew Wallace's *Ben Hur* for a picture of the "Wise Men of the East" traveling and camping with their dromedaries. See CAMEL.

Drone. See BEE.

Dropsy, in medical science, an accumulation of the serum or colorless portion of the blood under the skin, generally in various local parts of the body. Local dropsy is known as dropsy of the chest, of the brain, of the eyelids, etc. It is thought to be due to insufficient heart action in the collection of the blood, or to obstructions in the veins which retard the return of the blood to the heart. The accumulation of watery liquid is frequently so great that a physician is able to give temporary relief by tapping the affected locality and drawing the water off. It is a disease that has as yet shown little inclination to yield to medical treatment. See MEDICINE; DISEASE.

Drowning, death from being under water. In trying to breathe, a drowning person fills his lungs with water. Death ensues, not on account of the water, but from suffocation, that is, the drowning person cannot obtain air. Struggling ceases in from four to six minutes. If a person has not been under water more than ten or twenty minutes, an effort should be made to set up artificial breathing. The patient should be laid face downward on a roll of cloth, or anything that will elevate the chest above the level of the face. This will permit a portion of the water to run out. The patient should then be rolled over on the side to induce an artificial gasp, and rolled promptly back on the breast again. This should be done every four or five seconds, that is, twelve or fifteen times per minute. The weight of the body on the chest drives the air and water out. Turning the body on its side removes the pressure, and air enters the chest. The operation should be kept up indefinitely. Instances have been known where life reappeared after several hours of work of this sort. In the meantime, others should make every effort to remove wet clothing and to dry the body, particularly the arms and legs, and wrap them in warm, dry blankets. See SWIMMING.

Drugs, a general term covering all materials whatever entering into medicines. The history of the drug trade is really the history of medicine. For long centuries a struggle was carried on between the advocates of vegetable remedies and the advocates of minerals—between simples, as balsams, gums, resins, roots, and leaves, on the one hand, and chemicals, as mercury borax, salt, sulphur, lead, soda, and lime, on the other. See article on CHEMISTRY. At one time the pharmacist or druggist was chiefly a gatherer and curer of such plants as dandelion, boneset, sassafras, ginseng, snakeroot, and the like.

The early American druggist carried and dealt in many articles now considered a part of the hardware trade, as nails, glass, putty, paint, and oils. The list of drugs now recognized by the medical trade, the *materia medica* of the pharmacist, includes over a thousand titles. It is safe to say that the druggist deals in a greater number of articles, representing more localities and more remote parts of the earth, than any other business man of his acquaintance.

The discovery of America added a surprisingly large number of drugs to the market. The old chroniclers make much of the wonderful herbs and barks of America, such as tobacco, quinine, sassafras, sarsaparilla, jalap, ipecac, etc. Stone oil, or petroleum, at first so rare as to be used only in medicines and as a liniment, was found first in Virginia and was introduced to the world as an American remedy. Vaseline and a large number of petroleum products owe their use to American ingenuity and enterprise.

Fifty years ago the druggist compounded most of his medicines at great expense of time and labor. Today about 8,000 patent medicines and remedies, prepared in manufactories, are listed in the wholesale druggist's catalog. So far as compounding goes, the retail druggist now confines his efforts to filling prescriptions.

One of the modern devices appreciated by those so unfortunate as to need medicines is the administering of nauseous and bitter drugs in sugar-coated pills, gelatine capsules, and tablets. Over five hundred varieties of the latter are on the American market. Candy is the direct outgrowth of sugar-coating pills. The druggist used sweets to make his medicine agreeable and found in time that the sweets

gave quite as much satisfaction without medicine. From the latest statistics, it appears that 276 manufacturing pharmacists, in the United States alone, employ 6,000 people and turn out about $30,000,000 worth of preparations a year. In 1906 the American jobbers imported drugs to the amount of $16,414,868.37.

Druids, an order of priests among the ancient Britons and Gauls. Little is known of them. The best account is found in the sixth book of Caesar's Gallic War. Like the Hebrew tribe of Levi, they were exempt from taxes and military service. They practiced their rites in the recesses of oak groves and held the mistletoe in reverence. Some have tried to picture the Druids as corresponding to the Magi or wise men of the Persians, conjecturing that the rites of the Magi and of the Druids originated in a common source. The dolmens and circles of stones, such as are found at Stonehenge, were formerly considered druidical remains; but they are now thought to be the work of a stone age preceding the Celts. Among much that is misty we are certain of a few facts. The druidic priesthood withstood the Romans with fanatic zeal, reminding the reader of Tecumseh's brother, the prophet who brought on the battle of Tippecanoe. At all events, the Romans found it necessary to hunt out the Druids, cut down their sacred groves, and exterminate them before they could reduce Gaul and Britain to anything like quiet. The Isle of Mona, now Anglesea, was the headquarters—the sacred seat of druidism—in the British Isles. See BOADICEA; CELTS.

Drum, a musical instrument played by percussion or pounding. The ordinary drum consists of a wooden or metal cylinder, shaped like a cheese hoop. A circular sheet of parchment, called a head, is stretched taut over each end, and held in place by a hoop. Cords interlacing from hoop to hoop serve to regulate the tightness of the drumheads. The tighter the vellum, the higher the note. The tambourine, the timbrel, and the drum are all of Eastern origin; the former two are played by the fingers. The drum is played with sticks. A snare drum is played by two sticks on the same end. It is a regular accompaniment of the fife. The large bass drum is sometimes called the Turkish drum. It is played by two padded sticks, one at each end. It is a regular feature of a military band, and has its place in the orchestra. The kettledrum used in the orchestra is a hemispherical metal basin covered with vellum and resting usually in a tripod. It may be tightened by screws. Kettledrums are played in pairs—one being tuned a fourth below the other. See ORCHESTRA.

Drummond, Henry (1851-1897), a Scottish geologist and author. He was born near Sterling. His education was received at the University of Edinburgh, and at that of Tübingen, Germany. In 1887 he was appointed lecturer on natural science at the Free Church College of Glasgow, and several years later was made professor of natural science in the same institution. He visited America during one of his vacations, lecturing in the United States and in Canada, although the real object of his visit was a geological expedition to the Rocky Mountains. He made explorations also in central Africa, searching for rare forms of animal life. Mr. Drummond possessed remarkable power over young men, and worked extensively among them, especially in colleges and universities, his great gift seeming to be in transmitting to them something of his own devotion to high ideals. He lectured in many English speaking countries, making two later visits to America for that purpose, and becoming very popular in both the United States and Canada. Among his published works, *Natural Law in the Spiritual World,* an attempt to reconcile science and religion, stands first. It has run through thirty-three editions and has been translated into several languages. Other works are *Tropical Africa, The Greatest Thing in the World, Pax Vobiscum,* and *Ascent of Man.*

Drummond, William Henry (1854-1907), a Canadian physician and poet who made a lasting place for himself in Canadian literature with his dialect poems about the French *habitants.* He was born in County Leitrim, Ireland, but came to Can-

ada in early youth. He studied at the English high school, was graduated from McGill University, and in 1884 was graduated in medicine from the University of Bishop's College. Dr. Drummond began professional practice in a village composed of French *habitants,* Scotch-Irish, English, half-breeds and Indians. He was a naturally athletic man, enjoyed camp life, became well versed in wood lore, and had ample opportunity to study the characters of the villagers with whom he lived. Dr. Drummond later removed to Montreal, practicing there until his death and writing the humorous and pathetic dialect poems that have made him famous. Of all his poems, those about the French *habitant,* in which the characters use broken English that heightens the poetic effect, are undoubtedly the best. The best known works of Dr. Drummond are *The Habitant, Johnnie Courteau and Other Poems, The Great Flight, The Last Portage*, *The Voyageur, Leetle Bateese* and *The Wreck of the Julie Planté.* Dr. Drummond's collected poems, edited by Louis Frechette, were published in 1912.

Druses, a people inhabiting the southern part of the Lebanon Mountains. They have light complexions and active, war-like habits. They speak the Arabic language, and have dwelt there since the eleventh century. They number less than 100,000.

Dry Farming, a recent term applied to scientific treatment of soil under semi-arid conditions. There is a vast amount of rich land in the Great Plains region and westward that lacks water only to become as fertile as the Mississippi Valley. There are in New Mexico, Wyoming, Montana, Utah, Colorado, Idaho, not including sections of all the states situated near the hundredth meridian, over 80,000,000 acres of naturally fertile, but dry land that needs water to become fertile. It is estimated that irrigation projects, present and future, may convert a possible ten per cent of this land into agricultural land of high value. While not belittling the efforts of those interested in irrigation, intelligent farmers are of the opinion that more effort and money should be expended in making people acquainted with methods of dry farming. By proper treatment of the soil it is considered practicable to raise a crop each year wherever the yearly rainfall is not less than thirteen inches; and crops each alternate year where the annual rainfall is not less than ten inches.

Dry farming is not an attempt to train crops to grow with little moisture, for Nature's demands are fixed. The roots of the wheat plant need to imbibe a fixed amount of water to produce a given yield of straw and of grain. Dry farming addresses itself to the problem of saving the rain that falls and of seeing to it that the roots of useful plants, not weeds, get it. Under the leadership of Mr. H. W. Campbell, now of Lincoln, Nebraska, common sense experiments have been carried on for over twenty-five years. Mr. Campbell began his work on a farm in South Dakota. He became famous as a worker in farmers' institutes, and was employed by the Burlington Railway to establish demonstration farms along its lines of road in the semi-arid region. By following a few carefully thought out principles of soil tillage, he was able to raise abundant crops of wheat, oats, potatoes, beans, peas, millet, sugar beets, and kaffir corn; while the crops in fields across the road from his, having precisely the same soil, but farmed by ordinary methods, suffered from drouth to such a degree that they were not worth harvesting. The difference between forty bushels of wheat and failure, and between sixty bushels of oats and nothing, right out in the open, without fertilizers and without other moisture than rainfall, was sufficiently striking to arrest attention and change agricultural methods in this region.

Mr. Campbell's methods have been tested and approved by practical farmers and agricultural stations. They have been found as effective as they are simple. They require horses, implements, unceasing industry, and vigilance. The main principles of dry farming are:

1. *Deep plowing*—not less than seven inches. This is to allow the rain, when it does fall, to enter the soil and not run away. The problem is the very opposite of drainage.

2. *Subsoil packing.* Continued cultivation with a disk-harrow tends to pack the soil three inches below the surface. A disk with an outer edge so shaped that it acts like a wedge to force the soil particles together has been found to work well. The object of subsoil packing is to keep the water from evaporating. Mr. Campbell was started thinking by noticing that the tracks made in his fields by wagon wheels and the footprints of his team retained moisture and gave an increased yield.

3. *Surface cultivation.* The rule is to plow as soon as the crop is off and disk after every shower. The idea is to turn the moist surface into the soil bed and prevent evaporation. Gardeners who get out in the early morning and hoe the dew into the soil find their reward even in regions not so dry.

4. *Frequent disking even in the dryest of weather.* This is to create and maintain a loose surface covering of dust. It is found that dust, by breaking up the capillarity of the soil, is one of the most effective mulches known. Ground covered with dust does not dry out readily. If the dust be scraped aside, the soil beneath will be found to be as moist as though it had been protected by litter or leaves. After crops are sown the disk is abandoned for a toothed tool, a horse hoe, or the Campbell surface cultivator. It is so essential to keep up the dust blanket that even at the risk of uprooting a chance stalk of grain, farmers cross and recross their growing grain fields all through the early summer, stirring the soil especially after a shower, that a layer of dust may be formed to prevent the escape of precious moisture.

5. *Eradication of weeds.* Inasmuch as a growing plant imbibes moisture through its roots and allows it to escape through its leaves, it follows that weeds are wasteful of water, the dry farm's chief treasure. Garden, orchard, potato field, and all fields must be kept free from wasteful weeds.

6. In regions having from ten to thirteen inches of rainfall, it is found best to summerfallow each second year. The ground is plowed to admit water. A dust mulch is maintained to prevent the escape of water. Weeds are not allowed to pilfer the supply. A second season finds the soil with a store of moisture sufficient to raise a crop.

To meet conditions requiring one-half of the land to lie idle each year, the government permits homesteaders to take a half section of public land in regions of scant rainfall. As stated, men, teams, implements, and untiring industry are requisites to succeed in dry farming, but the results already attained mark a signal triumph for American agriculture.

It remains to be noted that Mr. Campbell's success and reputation are due to seeking the cause of as simple a matter as the increased productivity of a wagon track. One of his first discoveries was that a broad track like that of a heavy roller did not produce the desired result. The track, he found, needed to be so narrow that earth falling from the sides formed a dust mulch. In other words, he discovered that subsoil packing and a dust cover, not surface rolling and packing, were what was needed to hold the moisture to be drawn upon by the growing plant.

Dry Rot, a decay likely to attack seasoned timber or dead trees. It is due to the growth of peculiar plants of the fungi order. The branching threads, not unlike those of bread mold, penetrate the fibers of the wood and absorb its substance. Not infrequently a timber in a building or bridge, apparently sound, is found to be a mere shell full of crumbling white, yellow, or red dust. Notwithstanding the name, dry rot is more prevalent in the moist climate of Europe than in America. Oak is especially subject to its attacks. The fungus cannot grow in a timber kept perfectly dry. Soaking in creosote and painting before the spores get a footing are preventive measures. Building inspectors test for dry rot with a long awl or probe. The bones of living animals are sometimes attacked by a fungus growth, similar in its powdery effect to dry rot. Figuratively, and with reference to character, a person who preserves a fair outward appearance while inwardly losing

strength, courage, and initiative is said to be affected with the dry rot.

Dryad, or **Hamadryad,** hăm′a-drī-ăd, in Greek mythology, a wood nymph whose life was supposed to be bound up in that of her tree. The wanton destruction of a tree was therefore regarded as an impious act, to be punished by the vengeance of the gods. Erisichthon once felled a tree whose dryad was beloved by Ceres. As a punishment, he was afflicted with insatiable hunger. He ate everything he could get, selling all his possessions and his own daughter for food. At last he consumed his own limbs, and began eating his body before death released him. The dryads were partners of the god Pan in the dance. See PAN.

Dryden, drī′den, **John** (1631-1700), an English poet. He was of Puritan ancestry and was educated at Cambridge. The Restoration took place just as he was about to enter active life. Doubtless he had expected preferment from influential relatives who now came into disfavor. Dryden seems to have shifted to the winning side. He espoused the royal cause and published an ode of welcome to the returning king. He married an earl's daughter and enjoyed royal patronage. He became poet laureate, a position which he held until the Revolution of 1688. The revival of the drama seemed to offer a lucrative field to a professional author, and Dryden devoted himself with great energy to the stage. He selected popular subjects, aimed to treat them in a popular manner, and sought favor by prefixing to most of his works prefaces in praise of those in power. After the Revolution, having lost favor with royalty, Dryden lived an obscure life, suffering from poverty, ill health, and the hatred and malice of his enemies. His energy, however, was unimpaired. During his last years, he produced translations from the Latin of Juvenal and Virgil. He died in 1700. While his family were preparing to bury him as their poverty could afford, a large subscription was raised. His body was borne in state to Westminster and laid between the tombs of Chaucer and Cowley.

In religion and politics Dryden may be regarded as the opposite of Milton, upholding Tory and Catholic views as Milton upheld those of Whig and Puritan. Dryden wrote twenty-eight plays and won the reputation of being the first dramatist of his time. In his early plays he is the representative of the change from the Elizabethan drama to that formed on French models. Dryden's plays were written to please the popular taste. They are gross and immoral, and present no fine delineation of character—no humor which is worthy the name. Dryden himself said, "I confess my chief endeavors are to delight the age in which I live. If the humor of this be for low comedy, small accidents, and raillery, I will force my genius to obey it." *All for Love* is probably the best of these dramas.

Dryden's satires, while most of them are controversial and therefore fail of permanent favor, are of a much higher rank than his dramas. They are written usually in the rhymed couplet, or heroic couplet, as it is called. *Absalom and Achitophel* is an allegory in defense of the king. His *Hind and Panther* is another allegory written in defense of the Catholic church. The hind of spotless white is the Roman Church. The panther ready to spring is the English Church established by Henry VIII. The Independent or Puritan church is a bear; the Quaker, a quaking hare; the Baptist, a bristling boar. Dryden's *Alexander's Feast,* an ode for St. Cecilia's Day, written in old age, is called the noblest ode in the English language. Dryden's prose, in the form of essays, prefaces, or dedications prefixed to his poetical works, is admirable. It is critical in character, in style easy, animated, and vigorous.

Dryden is considered the forerunner of Pope, Addison, and the other classical writers of the Queen Anne age in literature.

Here is a handful of coins from Dryden's mint:

As sure as a gun.
A green old age.
None but the brave deserves the fair.
Men are but children of a larger growth.
Love either finds equality or makes it.
Beware the fury of a patient man.

Ill habits gather by unseen degrees,—
As brooks make rivers, rivers run to seas.

SAID OF DRYDEN.

By Dryden we were taught to think naturally and express forcibly.—Dr. Johnson.

Dryden was incomparably the most distinguished author of his age; but it was not an imaginative age, therefore not an age favorable to the truest and most lasting kind of poetry. In prose he shines, and in his historical and critical judgments of literature he stands forth as the most commanding literary personality of his age.—Gayley and Young.

His plays, excepting a few scenes, are utterly disfigured by vice or folly or both. His translations appear too much the offspring of haste and hunger; even his fables are ill-chosen tales conveyed in an incorrect though spirited versification. Yet amidst this great number of loose productions, the refuse of our language, there are found some small pieces, his "Ode to St. Cecilia," the greater part of "Absalom and Achitophel," and a few more which discover so great genius, such richness of expression, such pomp and vanity of numbers, that they leave us equally full of regret and indignation on account of the inferiority, or rather, great absurdity of his other writings.—David Hume.

I admire Dryden's talents and genius highly; but his is not a poetical genius. The only qualities I can find in Dryden that are essentially poetical are a certain ardor and impetuosity of mind with an excellent ear. . . . There is not a single image from nature in the whole of his works.—William Wordsworth.

Mr. St. John, afterwards Lord Bolingbroke, happening to pay a morning visit to Dryden, whom he always respected, found him in an unusual agitation of spirits, even to a trembling. On inquiring the cause—"I have been up all night," replied the old bard; "my musical friends made me promise to write them an ode for the Feast of St. Cecilia; I have been so struck with the subject which occurred to me, that I could not leave it till I had completed it—here it is, finished at one sitting."—Warton.

His (Dryden's) indelicacy was like the forced impudence of a bashful man.—Walter Scott.

Without either creative imagination or any power of pathos, he is in argument, in satire, and in declamatory magnificence, the greatest of our poets.—G. L. Craik.

Dryden's faults are numberless, and so are his beauties.—Cowper.

Dual Alliance. See TRIPLE ALLIANCE.

Dublin, the capital of the Irish Free State, is situated on the eastern coast at the mouth of the Liffey River. With reference to the Irish Sea it is directly opposite Liverpool, from which it is 138 miles distant. The Liffey, spanned by numerous fine bridges, flows through the center of the city from west to east. Below the last of nine bridges the river is crowded with ships. The central, official, and commercial part of the city is essentially English. The Bank, Trinity College, various government buildings, the names of the public squares, streets, and bridges, and a lofty monument to Lord Nelson, the hero of Trafalgar, all bear witness to British rule. This part of the city is adorned with fine edifices, green, well-kept squares, and numerous statues of public men, as Burke, Goldsmith, O'Connell, Moore, Grattan, and William III. The custom house is a handsome building, a city block in size. It has lofty porches and doors. It is adorned with statues of Plenty, Industry, Mercury, and Neptune. The Four Courts, or Hall of Justice is Phoenix Park, formerly the residence of the lord lieutenant, is considered one of the most beautiful parks in Europe. There are several fine institutions of learning in Dublin, among them being Dublin University, the largest educational school in Ireland, the College of Science and the Roman Catholic University. A little northwest of the city is Phoenix Park, which has an area of 1,759 acres and is one of the most beautiful parks of Europe.

Manufactures are not carried on to any large extent, though brewing and distilling are important industries.

Dublin was captured by the Danes in the ninth century and remained in their possession until the English conquest. Sheridan, Swift and Steele lived here. During the struggle for the establishment of the Irish Free State the city was the scene of many fights and riots. Population, 399,000.

Dubuque is the oldest city in the state of Iowa. As far back as 1788 it was an important trading and mining camp. It became a settlement of prominence in the middle west, in 1833, when Julien Dubuque, a French Canadian trader and the city's founder, established the first white settlement. The Federal census gave Dubuque a population of 39,141 in 1920.

Dubuque is one of the most important cities in Iowa; its principal industrial plants are wood-working shops, cast iron foundries, casket and casket hardware factories, boat factories, barge and boiler works, steel and sheet metal works, car repair shops, heating and plumbing supply factories, phonograph, clothing and shoe factories, meat packing plants, confectionery and soft drink plants and bakeries.

The two largest sash and door factories in the world are located at Dubuque. The larger wholesale and jobbing establishments handle crockery and glassware, stationery, flour and feed, groceries, fruits, coffee and spices, sugar, automobile accessories, drugs, hardware, etc.

Four railroads enter the city—the Illinois Central; Chicago, Milwaukee & St. Paul; Chicago-Great Western and Chicago, Burlington & Quincy. These provide excellent transportation and make Dubuque, in fact, the gateway to all of northern Iowa, southern Minnesota and North and South Dakota. Two wagon bridges and one railroad bridge span the Mississippi River at this point.

The waterworks plant is owned by the city, the fire department is completely motorized and equipped with all the latest improvements. The city maintains an excellent bathing beach and athletic field. Dubuque has two national banks and five trust companies and savings banks, the total deposits of which amount to about $15,000,000.

Dubuque, frequently called "The Heidelberg of America," is surrounded by most beautiful scenery. The business section is bounded on the east by the Mississippi River and on the west by a crescent of bluffs affording delightful views of valley and streams and adorned with beautiful parks and homes. There are two wonderful parks, Eagle Point Park, situated on the bluffs overlooking the Mississippi River, and Union Park, situated in a valley, between two big hills, are delightfully cool in summer. These two parks afford means for recreation, in the summer time, as does also the Mississippi River with its good fishing and boating.

Dubuque is noted for its educational institutions. A new senior high school and two new junior high schools have just been completed at a cost of $1,500,000, and in addition to these there are ten grade schools, one part-time school and nine parochial schools. The higher institutions of learning are Columbia College, a Catholic college for boys; Mt. St. Joseph's College, a school for girls; University of Dubuque, a co-educational institution, and Wartburg Seminary, a Lutheran theological school.

Dubuque has thirty-three churches and missions representing every creed. An archdiocese of the Roman Catholic church is located here. Dubuque has a fine new Y. M. C. A. building, also a Y. W. C. A. Other homes are Mary of the Angels Home for working girls, St. Anthony's Home for the Aged, St. Francis Home for the Aged, St. Francis Orphanage, Mt. Pleasant Home (orphans).

Dubuque boasts of two modernly equipped hospitals; a St. Joseph's Sanitarium and the finest county tuberculosis hospital in the middle west, known as Sunnycrest, and located on one of the bluffs overlooking the city and the beautiful Mississippi River Valley.

The Government has recognized Dubuque in many ways as a properly located city and has placed here a port of entry, an internal revenue office, U. S. circuit and district courts, weather bureau, and a government engineer in charge of Mississippi River improvements.

Dubuque has a Carnegie-Stout free library, one of the finest exclusive Elks club buildings in the United States, and a country club.

Ducat, the name of a coin which was formerly current in many countries, but is now no longer a monetary unit in any country. At one time it was a coin much favored by the Dutch, and the excellency of the workmanship of the pieces struck had the result that they were eagerly sought and imitated by other countries, especially Russia. Ducats, where they circulate at all now, are bought and sold simply as bullion.

Ducats, history relates, were first struck by the Byzantine emperors in or about the

11th century, and were copied by European countries. They are very rare now, and those in existence are to be found only in collector's cabinets. The value of the ducats formerly in existence varied as follows:

The gold ducat of Holland, weighing 3.494 grammes, value about $2.33.

The gold ducat of Russia, of the same weight, fineness and value as the Dutch ducat.

The gold ducat of Austria-Hungary, weighing 3.4904 grammes, value $2.34.

The gold ducat of Sweden, weighing 3.486 grammes, value $2.31.

The gold ducat of Hamburg, value $1.85.

The silver ducat of Sicily, weight 22.943 grammes, value 84 cents.

Duccio Di Buoninsegna (1255-1319), was born in Siena and lived there for the greater part of his life. Details of his studies are meager, but it is believed that Guido da Siena was one of his masters. He ranked next to Giotto among the painters of medieval Italy. Authorities are not certain as to the authenticity of the works attributed to him, but all are practically agreed that the *Madonna With the Three Franciscans,* the *Madonna With Four Saints,* and another *Madonna* in the Academy of Siena are his work. Among other works thought to be by him are some superb panels having great decorative value.

Du Chaillu, dü shâ-yü′, **Paul Belloni** (1835-1903), a noted traveler and author. He was born at Paris and died at St. Petersburg. His father was a merchant in the French settlement on the Gabun, West Africa. Young Paul was educated at the Jesuit mission. While quite a young lad he delighted in excursions into the region surrounding his father's trading station. His great enjoyment was the study of natural history. At various times he stuffed 2,000 specimens of birds. In 1853 he came to this country. Later he became a naturalized citizen of the United States. The members of the Philadelphia Academy of Natural Sciences became so interested in his tales of the jungle and its inhabitants that he was provided with means to explore the unknown region lying on the equator. So Du Chaillu returned to Africa and spent four years traveling alone over 8,000 miles. On his return he published *Explorations and Adventures in Equatorial Africa.* It was a treasure of scientific information. His accounts of gorillas and dwarfs were received with suspicion; but subsequent explorations have confirmed the truth of Du Chaillu's statements. In 1863 he started on a second expedition, the results of which were published in *A Journey to Ashangoland.* Other books, written especially for young readers, are *My Apingi Kingdom, The Country of the Dwarfs, Lost in the Jungle, Wild Life under the Equator,* and *Stories of the Gorilla Country.* In 1881 appeared *The Land of the Midnight Sun,* the result of several years' travel and observation in northern Scandinavia and Lapland. A later work, *The Viking Age,* describes Norse antiquities discovered in mounds, cairns, and bogs of Scandinavia. He discloses a state of civilization much more advanced than European writers have hitherto conceded. He maintained that the Teutonic people that conquered England was not of Anglo-Saxon, but of Viking, that is to say, Scandinavian blood, akin to the Normans. See GORILLA; DWARF.

Duck, a stout, plain-woven, canvas-like fabric, made of either linen or cotton. Duck is of various weights and styles of finish, is bleached or unbleached, dyed in plain colors or printed. In true duck, two warp threads are laid together in the loom and woven as one. Duck, as retailed, is usually about twenty-eight inches wide, but for manufacturers' purposes, it is made as wide as 208 inches. Duck in its different qualities is put to a variety of uses. Heavy, unbleached duck is used for awnings, sails, tents, stack covers, etc.; bleached duck for men's summer clothes, women's and children's suits, and waiters' coats and aprons. Fancy striped duck is used for tents and awnings. Elastic linen duck is used as an extra stiffening in men's coats.

Duck, a swimming bird allied to the goose and swan. Three toes, extending forward, are webbed; the fourth toe is free. The edges of the bill are furnished with coarse serrations for holding food, or else

fine ones for straining food out of water. Like all birds, and waterfowl in particular, the duck presses oil with the bill from a gland situated above the tail and dresses its feathers with care. Unless ruffled by the wind a duck's coat is water-proof. Ducks are birds of strong, swift flight. They are found all over the world. In the winter season they betake themselves southward and northward toward equatorial regions, at least far enough to insure open water. In the spring they return to nest. The typical duck's nest is saucer-shaped. It is started with coarse material and is finished with the finest down from the breast. When the duck leaves her eggs she protects them with a coverlet of feathers.

There are not less than forty well known species in North America. They may be classified under three heads: fish-eating ducks, pond and river ducks, and sea ducks. The most prominent members of the fish-eating group are the sheldrake and hooded merganser. They live on fish. They pursue and capture their prey under water. The serrations of the bill enable them to hold a fish almost as well as an otter. Both the sheldrake and the merganser nest in hollow stumps or in holes in a bank. They prefer a wooded region.

The most prominent species of the river and pond ducks is the old time mallard. It ranges throughout the northern two-thirds of the world. The male has a glossy greenish or bluish-black head and throat, with a white ring around the neck. The breast is clad in rich chestnut; the belly in grayish white, marked with wavy black lines. The metallic green, pearl gray, and purple of the drake make him a handsome fellow, indeed. The duck is a modest looking lady dressed in brown streaked with black. The mallard is the finest of all ducks. It is considered the ancestor of nearly all our tame varieties. The shoveler or spoon-bill has a broad, spoon-shaped bill. It is provided with a strainer like that of a whale. Its plumage is almost as handsome as that of the mallard. It dislikes salt water.

The best of the small ducks of this group are the green-winged, the blue-winged, and cinnamon teal. They are easily approached, but fly with speed. Teal coming down the wind afford the hunter a difficult shot. It is believed that the teal is capable of flying at the rate of 100 miles an hour. Ordinarily teal are considered desirable game birds. In the northwest, however, especially along the Columbia River, they gorge themselves with carrion salmon, until they are worthless for the table. The black duck belongs to this group. The most beautiful of all American ducks are the pintail and wood duck. They rival the Chinese mandarin duck in beauty of plumage. The wood drake wears a glorious combination of green, blue, purple, chestnut, white, buff, and black. This species not only perches in trees, but nests at an elevation of from ten to forty feet above the ground. When the young are ready to leave the nest, the parent bird conveys them one by one in her bill to the water's edge.

The third group of ducks, the sea ducks, includes the scaup, scoter, golden-eye, harlequin, and old squaw. The redhead and the canvas-back are familiar inland as well. The canvas-back is a favorite table duck. In the autumn, it feeds in the streams and marshes of the West. Its favorite food is a bulbous growth of eelgrass. The canvas-back dives down into the water, seizes the eelgrass in its beak, pulls it up, bites off the bulb, and lets the stalk float away. The plant on which it feeds is erroneously called the wild celery, a plant to which it has no relationship. The traditional winter home of the canvas-back is Chesapeake Bay. The most noted of all the sea ducks is the eider-duck. It breeds far to the north. It excels all other ducks in lining its nest with an immense quantity of fine, downy feathers. The Eskimos gather these feathers for sale, being careful, however, not to disturb the ducks during the actual hatching season. About six or seven nests yield a pound of feathers.

Domestic ducks are too well known to require description. As stated, most breeds are derived from the handsome mallard. In eggs, feathers, and dressed meat, the American poultryman realizes about $7,000,000 a year from ducks. The duck is the most common fowl of China.

See BIRD; GOOSE; SWAN; POULTRY.

Duckbill, or **Platypus,** a peculiar animal belonging to the sluggish streams of Australia, Papua, and Tasmania. It certainly is one of the most peculiar, most irregular creatures in the animal kingdom. It combines in its make-up a number of features belonging to animals wholly unrelated. It is about twenty inches in length, and has a body shaped not unlike that of a muskrat, covered with glossy black outer hair, with fine beaver-like fur beneath. The tail is broad and short, the upper surface is hairy. The eyes are small, and bright. The ears have no external opening, but the animal hears very well. The jaws are prolonged into a duck-like bill of horn, covered with black, smooth, sensitive, bare skin. The feet are webbed and furnished with digging claws. The membrane of the front foot is large. It extends beyond the claws like a round disk but it can be folded back into the palm, so as to expose the claws for digging. The duckbill lives in colonies, in streams far enough from the sea to escape brackish water. It is a great swimmer and diver. Its food consists of snails, shell fish, and mud-loving insects, for which it puddles like a duck in muddy bottoms. The duckbill digs a burrow into the river bank, with an entrance under the water, but terminating in a dry, grassy nest, to which the female retires in the breeding season. One of the most peculiar facts about this quadruped is that it gives birth, not to young, but lays several white eggs about three-quarters of an inch in length and one-half an inch in diameter, covered with a soft papery shell, like the eggs of a turtle. The mother keeps these eggs warm with her body for a time until the young are hatched, when she suckles them like any other mammal. Duckbills are shy and difficult to observe. On the approach of a person they dive to the bottom of the water, or retire to their burrows and reappear only when they believe the coast to be clear. The adult makes a noise not unlike the growling of a puppy, but it is inoffensive and peaceable. The duckbill is also called the duck mole. See ECHIDNA; AUSTRALIA.

Duckhawk. See FALCON.

Ducking Stool, a contrivance for dipping common scolds under water. A chair was fastened securely to one end of a long sweep or pole mounted on a post by the shore of a pond or other body of water. The scold was tied into the chair amidst the plaudits of the rabble. An officer at the other end of the sweep whirled it around until the seat hung over the water, then worked his end up and down, churning the unfortunate culprit into and out of the water, amid a volley of oaths and vituperation, until the habit of scolding was overcome for the time at least. This relic of a coarse age was used generally in England at the time of the colonization of America, and it was introduced in the American colonies, both north and south. Its employment was not given over entirely until as late as 1806. See PILLORY.

Ductility, the quality which permits a substance to be drawn into a fine wire or thread. Heat increases ductility. Glass at a white heat may be drawn into oval-shaped threads like silk. Of the metals platinum is the most ductile. Then follow gold, silver, iron, copper, zinc, tin, lead, and nickel. Gold has been drawn into wires with a diameter of 4,000 to the inch. It is asserted that platinum wires, 30,000 to the inch, have been drawn. This is as fine as the thread of a spider. Silk, as it leaves the cocoon, runs about 5,000 to the inch. In comparison human hair is coarse. The finest hair is the six-hundredth part of an inch in diameter. Fibers of wool run from 600 to 1,500 to the inch. See WIRE; NAILS.

Ductless Glands, the name of a group of glands that were for many years a puzzle to the medical profession. The functions of ordinary glands, such as the salivary glands and the tear glands, were explained long ago, but not those of the ductless glands.

These glands comprise chiefly the thyroid and the parathyroid glands, located in the neck; the thymus gland, in the upper chest; the pituitary and the pineal glands, lying under the brain; the adrenals, which lie over the kidneys, and the male and female generative glands. These glands pour directly into the blood stream

a specific substance that influences the body by establishing an equilibrium and promoting the body's health. Yet, while it is known that these glands exert a powerful influence on the body, and that any deficiency in them causes ill health, the active principle of only two of them has been determined. These two are the thyroid and the adrenal.

Of the glands, the following functions have been determined: The thyroid maintains the equilibrium of the human organism, and especially the balance between the different endocrine organs. It is also responsible for the general tone of the body. Thyroid deficiency, at its worst, results in cretinism. Abnormalities of the thymus gland result in the prolongation of childhood on the one hand, and in early maturity and consequently early senility on the other. The pineal gland, regarded by Descartes as the seat of the soul, is functionally similar to the thymus, but is a more potent factor in muscular development. The adrenals influence all muscular activity, including the beating of the heart. These glands also influence the character of the complexion, and the color, distribution and time of appearance of the hair. The pituitary regulates the size of the body. An abnormal pituitary causes infantilism on the one hand, and gigantism on the other. It seems also to regulate all such periodic occurrences as sleeping and waking, etc. The generative glands regulate the masculinity or femininity of the hair, hands, skin, torso, voice, etc.

The method of treating abnormalities caused by improper functioning of the ductless glands has advanced rapidly in the last decade, considering the nature of the ills; but much remains to be done that is not likely to be done until the active agents of all glands have been isolated in such quantities as to permit exhaustive study. Upon this problem of isolating the active agents the finest minds of the medical profession are engaged.

Duel a combat by arrangement between two persons. A challenge and its acceptance are an essential part of a duel. The Pilgrims had scarce landed at Plymouth when a duel was fought by two workingmen. Duels were numerous throughout the thirteen colonies, yet persisted longer in the South. In 1804 Alexander Hamilton was killed in a duel by Vice-President Aaron Burr. General Jackson killed M. Dickinson in a duel, yet President Jackson dismissed four officers from the navy for engaging in the practice. Colonel Benton, the famous Missouri statesman, killed his man. The various states of the Union have passed laws forbidding the practice. Dueling is said to have originated in western Europe among the peoples of Teutonic descent. In the two centuries following the discovery of America it is estimated that from 2,000 to 6,000 Frenchmen alone fell yearly in duels. In case an opponent became obnoxious it was quite possible to hire an expert swordsman, whose trade it was to pick a quarrel, issue a challenge and run his sword through the body of the objectionable person. Dueling is now rare in France and still rarer in England.

See HAMILTON; CLAY.

See HAMILTON; CLAY.

Duessa, dū-ĕs′sa, in Spenser's *Faerie Queene,* a loathsome old witch. The name Duessa means "double-mind," or "false-faith"; and Duessa is represented as the daughter of Falsehood and Shame. She assumes the name of Fidessa and the appearance of a young and beautiful woman in distress. In this disguise she entices the Red-Cross Knight into the Palace of Pride, and leads him to drink of an enchanted fountain, which so paralyzes him that he is overcome by a giant. Una sends Prince Arthur to the rescue. He slays the giant, saves the knight, strips Duessa of her disguise, and drives her into the wilderness. Duessa appears under various disguises in several cantos of the poem. It is supposed that Spenser intended Duessa to typify the anti-Elizabethan party in religion and politics. In the fifth book she is said to represent Mary, Queen of Scots, taken as a type of the enmity of the Romish Church toward Queen Elizabeth. Whatever political and religious significance *The Faerie Queene* may have had in Spenser's time, is long since forgotten, but its romantic beauty and poetic imagery will endure for all time. See SPENSER; FAERIE QUEENE.

Dufferin and Ava, Frederick Temple Hamilton Blackwood, Marquis of (1826-1902), a British diplomat, statesman and colonial administrator, Governor-General of Canada from 1872 to 1878. He was born at Florence, Italy, the only son of the fourth Lord Dufferin, and educated at Eton and at Oxford. He became fifth Baron Dufferin on the death of his father in 1841. He won high favor at court, distinguished himself by literary production, and in 1855 was attached to the Austrian mission. In 1860 the Marquis was sent to Syria to inquire into the massacre of Christians, was appointed Under Secretary of State for India in 1864, and Under Secretary for War in 1866. In politics he adhered to the Liberal party; in private life he was a charmingly courteous and tactful gentleman. Though never a great statesman, he was always a diplomat. Created Earl of Dufferin in 1871, he was sent to Canada as Governor-General in 1872. His administration was unusually popular, and his tact and good sense were very influential in bringing Canada and the Empire closer together. He was Ambassador to Russia from 1879 to 1881, Viceroy of India from 1884 to 1888, Ambassador to Italy from 1888 to 1891, and Ambassador to France until 1896. Queen Victoria created him Marquis of Dufferin and Ava in 1888. He received honorary degrees from Oxford and other universities. His published works include *Contributions to an Inquiry Into the State of Ireland*, *Our Vive-Regal Life in India,* and numerous other works.

Dugong, a marine animal belonging to the sea cows. It is several feet in length. It is related closely to the manatee of the Florida coast. It lives on seaweed in the border waters of Australia, the Indian Ocean, and the Red Sea. The dugong has a ruddy head, almost human in outline. The female swims with one flipper, clasping the young to the breast with the other. When she dives she shows a fish-like tail. It is supposed that the mermaid myth first told by Arab seamen arose from seeing this creature. The dugong is almost extinct. See MANATEE; MERMAID.

Duilian Column, a column in the Forum at Rome, which commemorates the naval victory of Gaius Duilius over the Carthaginians. Michelangelo restored this column, and it is now in the Palazzo de' Conservatori on the Capitoline Hill. The original was destroyed by fire, and the restoration bears an inscription, which is a part of the original.

Duke, a title of nobility ranking below that of Prince. The term is akin to the Venetian *doge* and the French *duc*. All three are derived from the Latin *dux,* a military leader. The younger sons of the sovereign of the United Kingdom are dukes. About thirty English dukes sit in the House of Lords by right of birth. The Irish and Scotch dukes select a part of their number. The first English duke was Edward, the Black Prince, who was made Duke of Cornwall in 1337. Dukes are created by the sovereign. On state occasions a duke is permitted to wear a coronet, consisting of a band of fine gold surmounted by eight strawberry leaves of the same metal. The top may or may not be closed by a velvet cap. In Austria the dukes of the royal family are called archdukes. In Russia, they are called granddukes. In Germany the title is held only by five persons. Each is the ruler of an independent principality. See PRECEDENCE.

Dukhobors, a religious communistic sect of western Manitoba. They are immigrants from Russia, where they broke away from the Orthodox Church. They accept the Ten Commandments and the "useful parts" of the gospels. They reject the doctrine of the Holy Spirit and the divinity of Christ. The only rule is right living. They submit with reluctance to any form of government, and were induced with difficulty to go through the necessary form of securing title to the lands they occupy. In Russia they were persecuted, killed, imprisoned, banished, flogged, and fined. Leo Tolstoi and others interfered, and they were permitted to emigrate. By 1900, 7,000 of the sect had settled in Manitoba. In 1902 a fanatical procession set out barefooted in winter seeking "the Christ." They declared they

could not make private property of "God's cattle," or use animals as beasts of burden. The Canadian authorities had difficulty in returning the pilgrims to their homes, since which they have settled down quietly. They are industrious, hospitable but exclusive, kindly to each other, skilled in agriculture and in road making. They hold property in common. Men and women work in shifts from 5 A. M. to 8 P. M.

It would be hard to find a community consisting of an equal number of men among whom there is less crime, and more industry, honesty, and hospitality, or more personal attention by the hale adults to the needs of the old people and the children. They are sober, temperate, healthy; they are a worthy and estimable folk in spite of their obstinacy, sectarian exclusiveness, and their too great dependence on a very fallible authority—Aylmer Maude.

Duluth, a city of Minnesota. It is situated at the western extremity of Lake Superior at the mouth of the St. Louis River. The name is derived from that of Daniel Greysolon Du Lhut (1645-1709), a French pioneer-trader who is supposed to have camped here at an early date. Duluth is called the Zenith City. In size it is the third city of Minnesota. It occupies sixty-nine square miles and has a water frontage of twenty-four. The site is long and narrow and rises rapidly from the water to bluffs from 400 to 800 feet high. A fine driveway along the bluffs commands a superb view of the city, the harbor, and the shipping. A narrow tongue of land several miles in length, cast up between the outflowing current of the river and the inbursting waves of Superior, is known as Minnesota Point. It affords natural harborage of great extent. A government canal guarded by lighthouses has been cut through the Point near the shore. An overhead ferry like that of Rouen, France, crosses the canal. The harbor is lined for miles with huge grain elevators, lumber piles and coal docks. West Superior, on the Wisconsin side of the St. Louis, seems a part of the same city. Palatial lake steamers, freighters laden with grain, boats piled high with lumber, and darting tugs, with the attendant whistling and turning of bridges, give the harbor a maritime air which a stranger is hardly prepared to expect in the interior of North America.

The most noticeable public buildings are the courthouse, the Federal Building, the Central High School and the State Normal School. The Carnegie Library, a number of large hotels and several large wholesale buildings are also worthy of mention.

The chief manufactures include iron and steel, lumber, woolen products, foundry and machine shop products, cement and matches. In 1915, the United States Steel Corporation erected a steel plant costing $10,000,000. This was greatly increased in 1921. This plant adds considerably to the industrial importance of the city.

Duluth is the second largest port in the United States in tonnage. Iron ore to the amount of more than thirty million tons is annually shipped; the Duluth elevators have a capacity of 36,325,000 bushels, and the coal docks a capacity of about 2,500,000 tons. Duluth is the nearest lake port to San Francisco and Denver, and is the terminus of the Great Lakes and St. Lawrence waterway. It is served by numerous railroads, including two transcontinental lines. Power for lighting and manufacture is developed to the amount of 75,000 horse power. The municipality owns the gas and water plants. The street railway system is very modern, about ninety miles of track traversing the city and connecting with Superior.

The Indian title to the town site of Duluth was extinguished in 1854. The city was incorporated in 1857. In 1870 the first railway, the St. Paul & Duluth, was built. The Northern Pacific followed soon after. The rapid growth of the population is indicated by the United States census returns. In 1880, 3,470; in 1890, 33,187; in 1900, 52,969; in 1910, 78,466, and in 1920, 98,917. See MINNESOTA;

Duma, a Russian lower house of parliament or congress created under the old regime. It was an elective body representing the people at large and was created August 6, 1905, as the result of a popular uprising. To it were guaranteed freedom of speech, assembly, and protection of per-

son, but the guarantees were not kept by the government. The upper house was known as the Council of the Empire.

The members of the Duma were supposed to be elected for five years, but the first and second Dumas lasted only a few weeks. The third served its full term. The fourth Duma, elected in November, 1912, was in session at the outbreak of the revolution. It did not incite it but was sympathetic.

The Duma had little power. It could have nothing to do with the army or navy, and little with finance. Legislation was in the hands of the ministers, who were responsible not to the Duma, but to the czar. If the Duma originated legislation it must have the approval of the minister of the department to which the legislation pertained. If a two-thirds majority opposed the attitude of the minister the president of the council laid the case before the czar who decided it. Ministers imposed taxation without consulting the Duma. The czar could dissolve the body at will. Despite all restrictions the Duma during its last years took a stronger stand in public affairs and brooked no curbing. The Council of Soldiers' and Workers' Representatives assumed superior power after the revolution.

The Duma members were elected by the most complicated process imaginable. When it was found, in 1905, that the Socialists were in majority, and that the same was true in the second Duma, by imperial order the electoral law was made more conservative. The members from Siberia, Poland, and the Caucasus were reduced from 89 to 39, the Central Asia Steppes were disfranchised and in all the representation reduced from 524 to 442. The elaborate system of electoral colleges could be, and was, manipulated to line the power in the hands of landed proprietors. There was a fixed minimum of peasant members, and every industrial concern employing 50 workers or more elected one or more delegates to the electoral college of its government. The seven chief cities of the empire elected their members direct; but even so, precautions were taken to give advantage to wealthy electors.

See RUSSIA.

Dumas, dü-mä′, **Alexandre** (1803-1870), a French dramatist and novelist. His grandmother on his father's side was a negress. Dumas was very dark and curly haired. His life was spent largely in Paris. As a young man he was employed by the Duke of Orleans in the capacity of secretary. This position afforded an opportunity for reading, study, and writing. He tried a number of farces. In 1829 he was lucky enough to hit on the plot of a play called *Henri III,* which brought him fame and several thousand dollars. From this time on he devoted himself to literature, producing plays and novels without end. The *Recollections of a Physician,* the *Count of Monte-Cristo,* and the *Three Musketeers*—the latter spun out by sequels into eight volumes—are perhaps his most noted works. He was an unprincipled, unchaste, depraved man, with dissipated habits, but a man of genius and ambition. After he had achieved fame and his writings commanded a high price he employed a bureau of hack writers and guided their efforts, turning off the product of his factory as his own. When this fact was discovered he fell into disrepute, but he had amassed a fortune. This he spent, in part, in the erection of a theater in which his plays should be acted, and in the building of a chateau or country seat which he named Monte-Cristo.

A natural son of the same name, called by way of distinction, Dumas the Younger, followed in his father's footsteps, and wrote a large number of dashing novels and dramas. The term demi-monde was coined by him as a title for one of his dramas. He was made a member of the French Academy. He died in 1895. The relation of the father to the son may be inferred from the following words of the younger Dumas. "My father is so vain that he is capable of standing in livery behind his own carriage to make people think he sports a negro footman."

Du Maurier, dü mō′rē-a, **George Louis Palmella Busson** (1834-1896), an English artist and writer of novels. Du Maurier was of a French family which had been driven to England by the Revolution. He was educated at Paris. He is

well known by his illustrations in *Punch, Once a Week, Cornhill Magazine,* and other periodicals. In 1891 he published *Peter Ibbetson,* a strange, dreamy story, involving an account of a supernatural power possessed by Ibbetson and his old sweetheart whereby they are able to meet in spirit. *Trilby* appeared in 1894 and became popular both as a story and in a dramatized form. Trilby is an artist's model who is made to sing by hypnotic power. Du Maurier's novels will be short-lived. His drawings for *Punch,* however, have permanent importance, since they are illustrative of the society of his time.

Dumbarton, a castle-crowned rock rising sheer from the north shore of the Clyde, eleven miles northwest of Glasgow. When Scotland and England united, this castle was one of four Scottish fortifications which, by the act of union, must be maintained. It is a position of some strength. Before the day of gunpowder it was impregnable, and was considered the key to the Highlands. Queen Mary was detained here when a child. She was making her way to Dumbarton when the men of Glasgow sallied out and defeated her at the battle of Langside. The rock is one of the few spots where the genuine Scotch thistle grows wild. A huge two-handed sword said to have belonged to William Wallace is kept in the castle. The summit of the rock commands an extensive view of the Firth of Clyde, the shipping, the green shores, the spires of Glasgow and the mountains of western Scotland. The rock itself is a striking object and cannot fail to attract the eye of the traveler. The town of Dumbarton, which contains the celebrated castle above referred to, is a well known seaport. The building of iron steamships is its most important industry. Dumbarton is also the name of a county of Scotland bounded by Perthshire on the north, Stirling and Lanark on the east, the Clyde on the south, and Argyll and Loch Long on the west. Its area is 241 square miles. Population, 98,014. See CLYDE.

Dum-dum Bullet, a bullet with a soft spot at the point. A steel bullet, or a lead bullet with a hard tip of steel or copper, cuts its way through a bone, leaving a hole as neat as though it were made by an auger. Such a wound renders a soldier unfit for duty, but, with ordinary care, is not dangerous. A bullet with an extra soft point, on the contrary, flattens slightly on striking and shatters a bone or splits it into fragments. Such a wound, unless followed promptly by amputation, is likely to prove fatal. The dum-dum bullet is so named from the fact that it was first made at the British arsenal of Dum-dum, near Calcutta, India. The use of these bullets in war was forbidden by the Hague Peace Conference of 1901-2.

Dumfries, dum-frēs′, a Scottish town on the River Nith, about six miles from the Firth of Solway. It boasts the oldest bridge in Scotland. In the church of a monastery here Robert Bruce slew the Red Comyn. Though a stirring town in ancient border days, it is now a trading city of 20,000 people. It is full of monuments of the past and is proud of possessing the last resting place of Robert Burns. This is a six-sided Greek edifice sheltering a marble group which represents the muse of Scotland robing the plowman poet with the mantle of inspiration as he stands by his plow. See AYR; BURNS.

> We linger by the Doon's low trees
> And pastoral Nith, and Wooded Ayr,
> And round thy sepulchres, Dumfries,
> The poet's tomb is there.

Dunbar, Paul Laurence (1872-1906), an American poet. He was born in Dayton, Ohio, June 17, 1872. He died there February 10, 1906. His parents were negro slaves. The father escaped into Canada prior to the Civil War. The mother was freed by the war and rejoined her husband at Dayton. The father was a plasterer and white-washer; the mother did laundry work. Both parents learned to read. The father preferred history; the mother poetry. Paul grew up in poverty. He was by turns a newsboy and an elevator boy. He was educated in the public schools. He first attracted notice by writing a poem for his high school class. In 1903 he published a little volume of verses called *Oak and Ivy Poems.* It was pronounced creditable for a young

man of any color. Though entirely capable of writing in standard English, young Dunbar felt that he ought to write in the negro dialect. It was his ambition to be regarded as the poet of the negro race. His best known poem is entitled *When Malinda Sings.* His mother's name was Malinda. His last poem, written for a Christmas book, was entitled, *Howdy, Honey, Howdy.* In 1898 he published a volume, *Lyrics of Lowly Life,* to which William Dean Howells wrote an introduction. "We call his verse dialect," said Howells, "but only so could he express the mental, moral, and social range of the Americanized black. He is humorous, tender, sympathetic. He realizes the limitations of his people and is not ashamed of them. He divines and reports the lowly hearts and minds." We add two characteristic stanzas of Dunbar's poetry. The first is a poem entitled *Possum;* the second is from his *Whittier,* lines written soon after the death of that poet. See NEGRO.

Ef dey's anyt'ing dat riles me
An jes gits me out o' hitch,
Twell I want to tek my coat off,
So's to r'ar an' t'ar an' pitch,
Hit's to see some ign'nt white man
'Mittin' dat owdacious sin—
W'en he want to cook a possum
Tekin' off de possum's skin.

Great poets never die, for earth
Doth count their lives of too great worth
To lose them from her treasured store;
So shalt thou live for evermore—
Though far thy form from mortal ken—
Deep in the hearts and minds of men.

Dunciad. See POPE, ALEXANDER.

Duncan, Norman (1871-1916), a Canadian author and educator, born at Brantford, Ontario, and educated at the University of Toronto. For three years he was on the staff of the New York *Evening Post.* From 1900 to 1904, he was professor of rhetoric at Washington and Jefferson College and later professor of English literature at the University of Kansas. Mr. Duncan became widely known through his stories of Labrador, the best known of them being *Dr. Luke of Labrador, Dr. Grenfel's Parish, The Way of the Sea,* and *The Cruise of the Shining Light.* Among his later works are *The Adventures of Billy Topsail, Billy Topsail and Company, The Measure of a Man, A God in Israel.*

Dundee, a city and seaport of Scotland, on the Tay, 8 miles from the sea, and 37½ miles northeast of Edinburgh. The city has fine streets and modern buildings, and the suburbs have fine villas. Shipping is important, and there is a fine harbor with adequate docking facilities. The chief manufactures are linens, canvas and bagging, thread and gloves. There are also large engineering establishments, and fishing is an important industry. Dundee is a very old city and is mentioned in medieval history. It is now an airbase for Great Britain. Population, 168,217.

Dune, a low hill formed by drifting sand. A dune is not a dust formation. Where dry sand is exposed the wind cuts it away and whirls the grains or slides them along the surface until they settle by their own weight into a place of shelter. This drifting takes place usually on a coast where a wind from the water has an unobstructed sweep. A very ordinary wind carries dry sand up a long slope, piling it just over the ridge. As the operation continues the far edge of a dune grows higher and higher, and travels or wanders farther from the shore. The traveler by rail around the southern end of Lake Michigan passes the faces of dunes advancing southward. They tower up to the height of two or three tall trees. Dunes are not infrequent in sandy prairie countries, as in the extreme western parts of Nebraska and Kansas. Cape Cod, southeastern France, the shores extending along the Bay of Biscay to the Spanish border, the Netherlands, Denmark along the North Sea, and Northeastern Prussia along the Baltic, have serious problems to meet. Forests, fertile farms, villages, and mills are buried; harbors are filled; and the courses of rivers choked up. See DENMARK; DUST; SAND.

Dunfermline, a town in Fife County, Scotland, 16 miles northwest of Edinburgh, on a long swelling ridge, 3 miles from the Firth of Forth, and backed by the Cleish Hills.

Dunfermline is a very old town and in

the period 1057-1650 was a residence of the Scottish kings and was for more than two centuries their place of burial. Here Charles II signed the Covenant in 1650.

The town is now one of the chief centers of industry in Scotland, tanning, brewing, distilling and the manufacture of brass and iron products being important industries; there are large collieries in the vicinity. Since the seventeenth century Dunfermline has been famous for the quality and beauty of design of the damask manufactured there, which is not surpassed by that of any other town in Great Britain.

Andrew Carnegie was born here in 1837, and his gifts to the town have been many. Among them were a public library, baths, and the fine estate of Pittencrief Park, together with other property and bonds yielding an income of $125,000 a year. Population, 39,886.

Dunkards, a religious sect originating in Westphalia in 1708. They were driven out by persecution and migrated to Pennsylvania. From this state as a center, they have colonized in various states of the Union. They refuse to take an oath in court or to render military service. Among the practices of the sect are baptism by immersion, the washing of feet, the celebration of the Lord's Supper, refraining from lawsuits, a simple style of dress and plain living. They anoint the sick with sacred oil and refuse to give medicines. They now have over a thousand congregations, chiefly within the triangle limited by Pennsylvania, Virginia and Indiana. They are not communists.

Dunkirk (Fr. Dunkerque, Church on the Dunes), is a fortified seaport of northern France, in the department of Nord. It is on the Straits of Dover, 53 miles northwest of Lille. Canals and railways connect it with the principal manufacturing centers of France and Belgium. This city is said to have had its origin in a chapel founded in the 7th century by Saint Eloi, around which a village soon sprang up. It was fortified in the 10th century by Baldwin III, Count of Flanders. Together with the province of Flanders, it came successively under Burgundian, Austrian and Spanish dominion. It was burned by the English in 1388. In 1658 the French took it from the Spanish and made it over to the English, but in 1662, Charles II sold it to Louis XIV. By the terms of the peace of Utrecht, 1713, the fortifications of Dunkirk were razed and the harbor was filled up. This was demanded by England because of the damage inflicted upon her shipping by Jean Bart, a native of the city and the popular hero of the French naval service. The harbor and fortifications were restored in 1783, and the city is now third in importance among French seaports. Dunkirk annually sends a fleet to the Iceland cod fisheries. In the city are manufactured soap, beer and cordage. There are also oil and sugar refineries, foundries, saw mills and flour mills. Here are located also four dry docks and a ship yard. At the convergence of the principal streets is a statue of Jean Bart. Nearby is a belfry 290 feet high that was once the western tower of Saint Eloi. The city contains a school of drawing, architecture, and music, a museum of paintings and a libary. The latest census gives the population as 38,267.

Dunkirk, N. Y., is a port of entry on Lake Erie, 41 miles southwest of Buffalo. Its fine harbor, which is protected by a breakwater, gives it command of an extensive lake trade. It is served by the Lake Shore & Michigan Southern, the Pennsylvania, the Erie, and the New York, Chicago & St. Louis railroads. Chief among its industrial plants are locomotive works, planing mills, radiator and gas engine works and shirt factories. It contains a high school, graded schools and a public library. Population, in 1920, 19,336.

Dunne, Finley Peter (1867-), an American journalist, known to the general public by the name of "Mr. Dooley," under which pseudonym Mr. Dunne's popular writings were published. Mr. Dunne was born in Chicago. After attending the public schools of that city he began his journalistic career as a reporter. In 1891 he became city editor of the *Times;* later a member of the editorial staff of the *Evening Post,* and of the *Times-Herald;* and in 1897 editor-in-chief of the *Evening Journal.* The "Dooley" sketches appeared in

the *Times-Herald,* in which, over the name of "Martin Dooley, Publican of Archey Road," Mr. Dunne commented philosophically and humorously upon a variety of subjects. Collected in book form these writings include, *Mr. Dooley in Peace and War, Mr. Dooley in the Hearts of His Countrymen, Mr. Dooley's Philosophy,* and *Mr. Dooley's Opinions.*

Duns Scotus, Joannes (1265-1308), a Roman Catholic divine and scholar, one of the great thinkers of the Middle Ages. The exact place of his birth is not known, Ireland, Scotland and England alike claiming him. He entered the Order of Franciscans, studied at Oxford, and in 1301 became professor of theology there. The acumen and brilliance of his defense of the doctrine of the Immaculate Conception won him the title of *Doctor Subtilis.* He gave public lectures and his eloquence and subtle arguments drew great crowds. His philosophy differed but slightly from that of Thomas Aquinas. One of his cardinal beliefs was that the immortality of the soul was a truth of faith, and one which could not be proved by reasoning. Among his works are the famous so-called *Opus Oxoniense,* of which the *Opus Parisiense* is an abridgment, and his commentaries on the Bible and Aristotle. The chief edition of his works was published at Lyons (12 vols.), in 1639. In 1304 he removed to Paris, where he died.

Dunstan, Saint (925-988), Archbishop of Canterbury. He was born and educated at Glastonbury. He became a monk of the Benedictine order, devoting his time to study and music, winning renown for his pious and ascetic life. In 945 under King Edmund he was made an abbot, his abbey growing rapidly into a famous school. Winning the favor of Edred, Edmund's successor, Dunstan was made prime minister, and took a prominent part in the direction of both civil and ecclesiastical affairs. In Edwy's reign he was banished, but under Edgar who came to the throne in 959, he was recalled and made Archbishop of Canterbury. The credit for Edgar's peaceful reign is due largely to the wise counsels of Dunstan. Ethelred deprived him of power again, and Dunstan's last years were spent in literary pursuits and in the work of his diocese.

Durban, an important South African city, principal port of the colony of Natal, was founded in 1834 and named for the then governor of Cape Colony, Sir Benjamin D'Urban. Until 1910, the prosperity of Durban depended upon its port, but since that time the city's manufactures have become important. To the north of the harbor lies the business section of Durban, while the residential district is situated on a range of low hills overlooking the harbor. Durban has a street railway and an electric lighting system, and a modern system of public instruction. Its growth has been steady, and it is now the first port of the Union of South Africa. The harbor is always undergoing improvement, wharfage is increasing, and the volume of trade growing. A wireless station was opened at Durban in 1910, the first in South Africa. The city has a population of 91,615, of whom 41,865 are white.

Durbar, originally an audience-room of an oriental monarch. Later the word came to mean the audience itself and is used to designate the assembly at which the successive English rulers are proclaimed Emperor and Empress of India. At the first Durbar, in 1877, Queen Victoria, represented by Lord Lytton, was proclaimed Empress of India. At the second Durbar, in January, 1903, King Edward VII and Queen Alexandra were proclaimed Emperor and Empress, being represented by the Viceroy and by the Duke and Duchess of Connaught. At the third Durbar, in December, 1911, when King George V and Queen Mary were proclaimed Emperor and Empress, the magnificence of the ceremony and the number present were greater than ever before, and for the first time the sovereigns were present in person.

Durer, Albrecht (1471-1528), a German painter, engraver and designer, generally considered the most important and most representative artist Germany has ever produced. He was born at Nuremberg, and for a time worked there with his father at the goldsmith's craft. At the age of 15 he was apprenticed to a

painter, wtih whom he studied for three years. Durer then spent four years in travel as a journeyman painter. In 1497 he opened a studio in his native city, and was thenceforth an independent master. Although his earliest work bears the stamp of genius, Durer's visit to Venice in 1505, where he studied the Venetian masters, resulted in a broadening of vision and a refinement of his art. In 1520 he journeyed to the Netherlands, and in the work done after this time is seen the influence of the early Flemish masters. Durer worked indefatigably to perfect his varied art, and the excellence of his later work is ample evidence of his success. He was a wonderful portrait painter. He invented a process whereby woodcuts were printed in two colors, and by combining the methods used in etching and engraving on copper he perfected the art of engraving. He introduced light and shade into engraving, thus making it pictorial by giving it tone. The following brief list includes some of his finest work: *Death and the Devil, Great Passion,* and *St. Jerome in His Study*, engravings; the *Smaller Passion* and *The Apocalypse*, woodcuts; *The Four Apostles,* his masterpiece of religious painting.

Durham, N. C., the county seat of Durham Co., is situated 26 miles northwest of Raleigh, on the Southern, the Norfolk & Western, the Durham & Southern and the Seaboard Air Line railroads. Durham is noted as the home of one of the world's largest granulated smoking tobacco factories, producing one of the most popular brands of granulated tobacco used. There are also cigar and cigarette factories, cotton mills, a sash and door factory and a fertilizer plant. Trinity College is located here, and the city has a school of fine arts and a conservatory of music, a public library and modern public schools. It was near Durham that the treaty between General Johnston and General Sherman was made at the close of the Civil War. The population was 21,719 in 1920.

Durum Wheat, a variety of common wheat. Durum means hard, having reference to the hardness of the kernal. The transparent appearance is due to the fact that the durum kernel contains less starch than the other varieties. Flour made from durum is used in the manufacture of macaroni and spaghetti.

The United States Department of Agriculture has made many experiments with durum wheat. It has two qualities that recommend it to the farmer: It resists rust, and may be grown in regions of light rainfall. In the southwestern part of Kansas it is sown as winter wheat. Farther north, it is raised as spring wheat.

Düsseldorf, a German city. It is situated on the Rhine, twenty-two miles below, that is to say north of, Cologne. The modern city is a thriving port and a railway center. The population in 1919 was 407,378. Düsseldorf was for a century or two the residence of the Princes Palatine and was a center of art. The most valuable part of the art gallery at Munich was formerly in the academy of art at Düsseldorf, and was removed by the elector when he changed his place of residence. In the first part of the nineteenth century the most celebrated school of painting in Europe was here.

Dust, fine earth capable of being carried in the wind. The smaller a particle, the more surface it presents to the wind in proportion to its weight. Doubling the diameter of a grain of dust multiplies its weight by the cube of two, or eight, and its surface by the square of two, or four. Trebling the diameter multiplies the weight by the cube of three, or twenty-seven, and the surface by the square of three, or nine, etc. The most prevalent dust is fine sand. Dust is carried several miles high into the air. In fact the atmosphere is never entirely free from dust, though heavy rains tend to bring it down. Grassy prairies and forests are almost free from serious dust; but in dry weather sandy tracts and large areas, in which fall plowing is the rule, are afflicted by dust storms disagreeable to the farmer and housekeeper alike. In the Sahara and other desert regions sand storms arise. Bird and beast seek shelter; the caravan halts; the Arab enfolds his face and person in a shawl; the faithful camel kneels

down flat and stretches its long neck forward on the sand, closes its long, silky eyelashes, and narrows the slit of its nose. Even the tireless vulture lights and disposes its head and plumage till the suffocating cloud is by.

Though apt to be regarded as a nuisance, dust is, after all, an advantage to the world. Water does not soak through genuine dust, because the particles do not lie closely enough together to permit the action of so-called capillarity. Compact soil, whether clay, sand, or mold, will draw water or absorb it while dust remains dry. A dusty surface is a preventive against the loss of water by evaporation, and saves large areas from becoming deserts. In semi-arid or dry regions, where rain is not to be expected during the summer, farmers pulverize the surface of the soil with fine-toothed harrows and form a dust blanket as early in the spring as possible, to prevent the escape of moisture by evaporation. The solid earth beneath holds the moisture of winter and spring until it is drawn upon as needed by the deep roots of the growing crop. Luxuriant crops protected by dust blankets may be seen growing side by side with barren, burnt up fields of equal fertility in which no pains were taken to prevent evaporation. Ruskin has chosen *Ethics of the Dust* as the title of one of his most instructive writings.

See DESERT; SAHARA; SAND; METEOR; VOLCANO.

It might be supposed there would be some place—for instance, amid the fresh white snows of St. Bernard Pass in Switzerland—where there would be absolutely no dust. But the men of science tell us otherwise. In fact the celebrated M. Jung collected snow at this very spot, 8,100 feet above the level of the sea; and when he had evaporated some fifteen liters of water produced by melting the snow, he found a very considerable quantity of dust; and this dust proved to be minute particles of iron!

Another scientist, M. Nordenskjold, in search of some place where dust would not be found contaminating the air, examined the greatest fall of snow in the memory of man (1871) at Stockholm, and likewise found a dust which proved to be metallic iron. Fearing that this might have come from neighboring roofs or chimneys, he had his brother examine the snow in a desolate plain surrounded by the forests of Finland. The black powder proved to be there also, and to be the same.

The fact is, the earth's atmosphere everywhere teems with dust. In the cities there is more than in the country; but not so much more as might be supposed. It has been estimated that the weight of dust suspended in the air above an ordinary city block is in the neighborhood of 33 pounds. At this rate the dust overhanging such cities as New York, Pittsburg, or Chicago would weigh several tons.

Ordinary city dust is made up of about three quarters cinders. The other quarter is organic matter. This means vegetable and animal, living and dead. For—unpleasant as is the thought—the dust contains its share of germs. Rains and snows reduce the quantity of dust in the air. In Paris it was found that an eight days' dry spell increased the quantity of dust in the air to three or four times the normal amount, which is from 6 to 8 milligrams to a cubic meter of air. Supposedly pure rain water will pick up dust from the air, so that a liter will yield all the way from 23 to 421 milligrams of dust.

Dust will travel marvelous distances in the air. On the 7th of February, 1863, there was a rain of sand in the Canary Islands, this sand coming from the Sahara desert 200 miles away. A more striking case was presented more recently when cinders from the great Chicago fire of 1871 arrived at the Azores forty days after that catastrophe. In the last century Europe experienced what was known as the celebrated "dry fog," which lasted for three months, and was found to have been caused by a volcanic eruption in Iceland.—Gibson Gardiner in *The Technical World*.

Dutch, the people and the tongue of Holland, now the Netherlands.

Dutch East Indies, a collective term for the Asiatic possessions of the Netherlands. The possessions include twelve island colonies or groups of islands comprised between 6° N. and 11° S. latitude and 95° and 141° E. longitude. These possessions were in the hands of the Dutch East India Company, 1602-1798. The government of the Netherlands is represented by a governor-general, a number of "residents," and a proper force of inspectors who control the natives through a vast host of petty native officials. Java is the chief of the East Indies. Sumatra and parts of Borneo, the Celebes, and the Moluccas and part of New Guinea are included under the term.

The majority of the natives are Mohammedans, but the Reformed Church, the Roman Catholic Church, and other churches

are well represented. In 1921 there were about 570 missionaries working there. There are public schools (government) where instruction is given through the medium of the Dutch language.

STATISTICS. The following are the latest reliable statistics to be had:

Area, square miles	683,000
Population (estimated 1920)	49,161,047
Europeans	169,355
Natives	48,112,706
Orientals	878,986
Chief Towns:	
Batavia	234,697
Soerabaya	160,801
Soerakarta	137,882
Samarang	106,852
Members of advisory council	5
Cultivated area, acres	18,829,000
Tea, pounds	80,784,646
Cocoa, pounds	2,000,000
Tobacco, pounds	89,500,000
Sugar, tons	1,577,528
Cinchona, pounds	15,544,328
Coffee, pounds	121,338,000
Tin, tons	22,560
Coal, tons	1,055,832
Petroleum, barrels	17,529,210
Imports	$262,164,000
Exports	$453,574,000
Miles of railway	3,923
Schools, all kinds	10,000
Pupils enrolled	827,887

See JAVA; BORNEO.

Dutch Literature. See LITERATURE, DUTCH.

Dutchman's Breeches, the common name of a wild herb belonging to the poppy family. It is related to the familiar bleeding heart of gardens, and to the wild squirrel corn. It grows in rich woods from Nova Scotia to North Dakota, and southward to the latitude of North Carolina. The stem and flower scape rise from a cluster of grain-like tubers crowded together in a scaly bulb. They are gorged with sap. The white, nodding flowers appear early in spring. The corolla is heart-shaped, having two baggy spurs, suggesting the common name, though Turk's Trousers would have been quite as appropriate.

Dutch Reformed Church, the national church of Holland. It traces its organization to the reformer, Zwingli, of Switzerland. Its doctrines are those of Calvin and Presbyterianism. The darkest days of the church were met during the repressive rule of Charles V. The house of Orange, from which William III of England sprang, is identified with the struggle of the church for liberty. The Dutch settlers of New Amsterdam organized congregations in the New World. As a branch of Presbyterianism the denomination is strong in the Middle States. Theodore Roosevelt is a member. The denomination has about 700 American congregations. Rutgers College is its chief educational institution.

Duties. See TARIFF.

Duval, dü-väl′, **Claude,** a noted English highwayman. He was born in Normandy in 1643 and was hanged at Tyburn, London, in 1670. Whether his exploits have been told aright or no, he has an unequaled record for relieving gentlemen of their purses. He was held to be a hero by the common people, and if tradition is to be credited, he was a favorite with the ladies of a wide circle. His alleged exploits have inspired many a bit of narrative to be found in the yellow literature of the past.

Dvorak, dvōr′zhäk, **Anton** (1841-1904), a Bohemian musician, born at Mühlhausen. His father was a butcher and the boy Anton was intended to follow in his footsteps. His musical talent, however, was so marked that he was allowed to study music. He played the violin in a theatre at Prague, and the organ in several churches. The *Stabat Mater,* a great religious work, first brought him fame as a composer. None of his subsequent compositions have exceeded it in popularity. His other works embrace operas, dances, symphonies, songs and cantatas. Dvorak's music is strongly individual and reflects the personality of the Bohemian people. See STABAT MATER.

Dwarf, a person much under the ordinary size. Dwarf means small; it does not mean misshapen. Dwarfs were known among the ancients. Aristotle and other writers held that a race of pygmies lived somewhere in Africa. This statement was verified by Paul Du Chaillu and Henry M. Stanley, who found a dwarf people in the interior of the Dark Continent. As compared with giants, who are seldom en-

tirely healthy or long lived, dwarfs are usually well built and active. Some of them have been decidedly intellectual, and have lived to a good old age. Their children are not infrequently of ordinary size.

A number of dwarfs have been celebrated. Philetus of Cos, the tutor of Ptolemy, was so small that his facetious friends said he was obliged to carry stones in his pockets to prevent himself from being blown away. Julia, the niece of the Roman Augustus, had a little handmaid named Andromeda, whose height was but twenty-eight inches. A French dwarf named Bebe lived in the Orleans family. He was but twenty-three inches in height. During the French Revolution he was made the carrier of dispatches. He was dressed in the clothing of an infant and carried in the arms of a nurse, thus escaping the search to which ordinary travelers were subjected. He died in Paris in 1858 at the age of ninety.

Among the legends connected with the court of King Arthur is one of a dwarf by the name of Tom Thumb. "In Arthur's court Tom Thumb did live," is the first line of an old English ballad. One of the most celebrated English dwarfs was Jeffery Hudson, whom Sir Walter Scott introduces, in his *Peveril of the Peak*. The Duke of Buckinghamshire, having invited Charles I and his queen, Henrietta Maria, to a feast, caused the crust of a huge meat pie to be cut, when out stepped Jeffery to the astonishment and amusement of those at table. The Duke presented Jeffery to the queen, in whose service he remained for many years. At the age of thirty, he was but eighteen inches in height. He then took a second growth, attaining a stature of three feet, nine inches. He appears to have been a peppery little chap, the butt of many teasing jokes. On one occasion, he challenged a Mr. Crofts to a duel. The latter, to carry on the jest, appeared armed only with a squirt gun; but the dwarf shot the unfortunate courtier dead. He was intrusted with several delicate missions to France. In Sir Jeffery's day the dwarf appears to have occupied a privileged place in European courts, not unlike that formerly held by the court fool. As late as the reign of Charles II, a court party is described as catching up a dwarf and tossing him from person to person, merely to enjoy his discomfiture.

The most celebrated American dwarf was Charles Stratton of Bridgeport, Connecticut. At the age of twenty-five he was but thirty-one inches in height. He married Miss Lavinia Warren, a woman of his own size. The pair were exhibited by P. T. Barnum, the American showman, both in this country and abroad. Queen Victoria is said to have taken a great interest in the little Charles, or General Tom Thumb, as he was popularly called. Scientists, who have sought for the physiological difference between dwarfs and other people, claim that the cells which compose the dwarf's body are of the usual size, but that for some reason there are not so many of them. In fact the fewer cells of a small body are apt to be of superior quality.

See PYGMY; GIANT.

Dwight, dwīt, **Timothy** (1752-1817), an American clergyman. He was born at Norwich, Connecticut. His father was a merchant. His mother was a daughter of the famous Jonathan Edwards. It is said that he was able to read the Bible fluently at the age of four. He was graduated at Yale at the age of seventeen. He taught in a grammar school, tutored in Yale, and served as a chaplain in the Revolutionary army. After the close of the war he opened an academy. In 1795 he was selected president of Yale College, a position which he held until his death. He is considered one of the ablest of a long line of Yale presidents. His published writings, which reach seven volumes, consist chiefly of theological essays and sermons. A grandson of the same name, a noted Greek and Biblical scholar, became president of Yale in 1886.

Dyeing, the process and art of imparting permanent color to yarn and cloth. Any animal, vegetable, or mineral substance, sufficiently porous to absorb coloring matter in solution, may be dyed; but, as commonly used the word has reference to fabrics, or to the animal and vegetable fibers of which fabrics are composed. The art

of dyeing is as old as civilization. Tyrian purple is supposed to have been used in Tyre 1,500 years before the Christian era. The ancient Egyptians, Greeks, and Romans employed dyes of various colors. During the Dark Ages the knowledge of this art seems to have died out in Europe. It is probable that the Jews preserved the secrets of the art. We learn from one account that, about the year 1160, of the 200 Jews then resident in Jerusalem, all were employed in wool dyeing, the trade being wholly in their hands. By the close of the thirteenth century the practice of the art of dyeing had spread again throughout Europe. Dyers' gilds existed in many cities, and knowledge advanced rapidly, until most of the natural dyes of the old world were well understood. The discovery of America resulted in the addition of two important dyestuffs—cochineal and logwood. Little improvement in methods was made until, with the development of chemistry in the nineteenth century, dyeing became an applied science.

If the various solutions used in dyeing possessed an affinity for the raw fiber, the process of coloring would be simple. Nothing but immersion in the dye bath would be required. As a matter of fact, this affinity is lacking, especially in cotton fiber. If a cotton fabric be put in the dye, the coloring matter is absorbed by the fiber to some extent; but if the cloth thus treated be washed, the dyestuff in most cases is dissolved again, and the fiber left in its natural color. This fact makes dyeing a difficult matter. The dyer must find some third substance which has a mutual attraction for the cloth or fiber and for the coloring matter; so that, acted upon by this substance, the fibers of the cloth will unite with the coloring matter and be permanently dyed. This third substance is called a mordant, from a French word meaning to bite; the old idea being that the mordant bit into the fiber, thus opening it up to the action of the dye. Every natural dye has its own particular mordant, most of the mordants being found among the metallic oxides. Before chemical research threw light upon dyeing processes the dyer worked blindly. If successful in a particular instance the recipe was preserved, and followed carefully for similar results. Often failure resulted, the cause of which it was impossible to explain. At present chemical laboratories are erected in connection with the larger dyeing establishments, and methods are regulated with scientific precision.

Certain questions connected with the principles of dyeing have occasioned much discussion. Some scientists regard the union between fiber and dye as a chemical action. Since, however, any dye may be removed from cloth or yarn and dissolved by certain agents, while the fiber remains utterly uninjured, it would seem that the action is mechanical, rather than chemical. A view held by some chemists is that the dyeing of wool is a chemical combination, but that the dyeing of cotton is merely a fixation of the color in the pores of the fiber.

It is evident that the principal part of every dyeing operation is the finding of a proper mordant and its successful application. Sometimes the fabric or yarn is treated with the mordant and then immersed in the dye bath. Sometimes the cloth is dyed first and then treated with the mordant. Sometimes mordant and dye are combined and applied to the fabric simultaneously. A little change in the strength of a mordant may effect a decided change in tint or shade. Thus a wide field for variety of shades is offered the dyer. For example, logwood alone will not dye cotton. With the proper use of mordants, logwood may be made to dye cotton in all shades of lavender, violet, purple, lilac, and slate.

In the manufacture of textile fabrics the dyeing may be done at various stages. Sometimes the raw fiber receives the dye. By this method, called stock dyeing, the color is fixed more firmly and is less likely to fade or lose its brilliancy. The spun yarn may be dyed, but it is difficult to be sure the dye enters the inner fibers of a tightly twisted yarn. The cheapest and most common method is called piece dyeing, which means that the woven fabric is dyed. The labor, in this case, is accomplished by machinery, and there is less waste of expensive dyestuffs than occurs

in stock and yarn dyeing. As has been said, cotton has less affinity than wool for natural dye solutions. Until artificial dyes came into use, therefore, the dyeing of cotton was a difficult process. The azo dyestuffs, a class of coal-tar colors, however, can be applied to cotton without a mordant, and produce brilliant and lasting colors. This fact causes azo dyes to be regarded as a most important class of artificial dyes.

Dyes are transparent and the effects they produce vary according to the light reflected by the fibers of materials before they are dyed. Obviously, therefore, black cannot be dyed, and such colors as red, blue and yellow can only be dyed in the same hues, unless the material, as is possible in the case of velvets and velveteens, be previously bleached. White reflects all rays of light and is essential as the basis for bright dyes. There must be chemical combination between the coloring matter and the cloth, and the dye must be dissolved in a solution having a weaker affinity for the colors than the cloth, while for economical working there must be accurate adjustment between these relations. Whether it be thought, therefore, that the processes of dyeing and calico printing are mechanical or definitely chemical, it is evident that in those processes there must be dependence upon scientific control.

Wool has a stronger affinity for dyes than silk, cotton or linen. The solutions used must be varied as occasion requires. The choice of dyes for a given material involves the consideration of fastness in washing, and the action of light. Certain dyes will fix themselves directly to certain fibers but not to others, as we have seen, without the use of mordants. The mordants commonly employed, such as tannin and the oxides of iron and aluminum, were discovered by chance, but science has explained their action, while chemical research has contributed to the discovery of many new kinds of coloring matter. In the art of dyeing the neglect of science is mainly responsible for the loss incurred by spoiled and damaged material.

It is claimed that Turkey red was used in coloring the mummy cloths used ages ago in Egypt, and much land was given over a few decades ago to the cultivation of the madder plant, from the root of which this dye was derived. Today alizarin, made by synthesis from anthracene, a coal-tar product, has lessened the cultivation of madder. Alizarin is widely used with a mordant for dyeing cotton, giving with iron oxide a violet color, with chromic oxide a brown, and with aluminum oxide a bright red.

It must not be supposed, however, that artificial dyes have replaced all natural dye materials, for such is by no means the case. Before the World War more than 100,000 tons of dyewoods were used annually in the United States, and that amount was greatly increased during the war years. Logwood, sumac, and, recently, Osage orange, as well as other woods, have been largely used as the source of natural dyes; and dyeing has progressed to the status of a fine art. See DYESTUFFS.

Dyestuffs, substances used for dyeing. Any dyestuff in solution is called a dye. Dyestuffs are known as natural or artificial. The natural dyestuffs are mostly of animal or vegetable origin, and are prepared by purely mechanical processes, such as grinding, crushing, or simply steeping, as in the case of certain chips and barks. Artificial dyes are prepared by chemical processes from coal-tar products.

The larger number of natural dyestuffs are of vegetable origin. They are from various parts of certain trees, plants, and shrubs. Logwood, used for red dyes, and, in combination with other substances, for purples, violets, and blues, is obtained from the chips of a Central American tree. Yellow fustic, from the Brazilian wood of that name; young fustic, from an Italian shrub, a variety of sumac; quercitron, from the inner bark of the dyer's oak of eastern North America; Persian berries, from the Levant; and turmeric, from the East Indies,—all yield yellow dyes. The shell of the pomegranate yields thirty shades of yellow dye. The roots of madder cultivated in the East Indies, the Levant, France, and Holland yield the dye that produces, not only the turkey reds, but madder, purple, orange, and brown. The Cape Verde Is-

lands and the northwestern coasts of Europe produce a seaweed that yields a rich dye. Indigo, obtained from the leaves and herbaceous parts of the indigo plant, is one of the most important dyes. Fifty shades of blue are produced from it. Sumac is raised in the Mediterranean countries for dyestuff, Sicily producing the best. It is gathered also in Virginia. Gall nuts, produced on the leaves and twigs of oaks and other trees by the punctures of various egg-laying insects, yield a valuable dyestuff.

Among animal dyes cochineal stands easily first in importance. The famous Tyrian purple is produced by a fluid secreted by a shellfish. Sepia is obtained from the common cuttlefish.

Until about fifty years ago the dyer depended entirely upon these natural products for his dyes, mixing and preparing them according to certain recipes; knowing, perhaps, under what conditions he was most successful, but not knowing why. In other words, his knowledge was wholly unscientific. The development of applied chemistry has opened up a new source of dyestuffs and has revolutionized dyeing processes. The dyer no longer works in the dark, but is guided by scientific principles. While the natural dyestuffs are still in use to some extent, they have been largely superseded by artificial colors, produced indirectly from coal-tar. Coal-tar is a thick, black, opaque liquid, which condenses in the pipes when gas is distilled from coal. Coal-tar was considered formerly a waste product; but the chemist has succeeded in obtaining from it many useful substances. It is the most abundant source of many beautiful dyes. These are classed frequently as aniline dyes, because aniline was the first substance discovered from which these dyestuffs were produced. There are, however, other groups of coal-tar colors besides those belonging to the aniline group. Coal-tar colors are more brilliant and give a greater variety of tint and shade than natural dyes. For some time after their discovery they were regarded as more transitory, especially if fabrics dyed with these colors were exposed to sunlight. This objection has been overcome to a large extent. At the present time the primary colors, as well as tints and shades produced by combinations of the primary colors, are extracted from coal-tar products. Some of these artificial colors have the same chemical constituents as the natural dye. A French chemist estimates that fourteen thousand shades and tints can be produced from coal-tar colors.

The dyer may purchase his dyestuffs prepared by the chemical manufacturer. From these the dyes or solutions are prepared at the dye works. The larger dye works have chemical laboratories in connection, and prepare their own dyestuffs. According to the last United States census, 37,000 people are employed in the manufacture of dyes, and in dyeing and finishing cloth.

For more than forty years before the World War the Germans had almost complete control of the artificial color business. While an Englishman, Sir William Henry Perkin, had discovered the first coal-tar dye, mauve, by accident, and in the course of a few years the use of this dye became so common both in England and France that it was referred to as "the mauve measles," the supremacy in manufacture from England to Germany about 1871. The reason, as stated, was twofold: "First, the neglect of organic chemistry in the universities and colleges of Great Britain, and then the disregard by manufacturers of scientific methods and assistance, and total indifference to the practice of research in connection with their processes and products." Here is an impressive instance of the absolute necessity of cooperation between the educational and research forces and the forces of industry, and the lesson applies with equal force to the United States and other countries.

When the great war broke out there were some twenty large German dye factories, all thoroughly organized and working together. In Switzerland, Great Britain, France and the United States there were relatively small dye concerns, entirely unorganized and producing only about ten per cent of the output of their German competitors. The total value of the dyestuffs consumed by the whole world

was about $70,000,000 a year, but the trade was most important, because from the crude dyestuffs and "intermediates" required by dyers, explosives could readily be made, and a plant manufacturing dyes could be readily transformed into one for the supply of munitions of war. In addition to this fact, the textile and other industries in America alone, with a yearly output of three billion dollars' worth of goods, are dependent upon the dyeing industry—and Germany had a practical monopoly of the business.

Under pre-war conditions there were only four or five dyestuff factories of moderate size in the United States; but when the German ports were closed by the war a number of small factories sprang up, and these have become firmly established. They manufacture the standard colors of a quality as good as, if not better than, those formerly made in Germany. The result has been that while in 1914 the United States imported 45,841,000 pounds of dyes, three years later the United States manufactured 45,977,000 pounds, or eight times as much as before the war, and also produced 323,000,000 pounds of "intermediates." This production has increased until now there is more money invested in dye factories in the United States than in any other country, and the industry is no doubt established on a permanent basis.

Artificial Dyes. The artificial dyes have several advantages over natural products. For instance, the range of shades for any color can be extended and graded by the employment of suitable materials in a manner that cannot be attained by using the natural dyes. The purity of artificial dyes is also greater, and the total cost of production is considerably less. On account of this superiority of synthetic dyes the cultivation of indigo and madder, and the trade in cochineal have been almost completely overshadowed. Both indigo and madder, produced by artificial means, have proved capable of beating their natural prototypes in commercial competition, and the use of cochineal, formerly one of the most important of natural dyes, has been largely replaced by the discovery and use of azo-red dyes which imitate its color very closely.

The most important material used in the economical manufacture of indigo is naphthalene, which is obtained from the creosote oil fraction of the tar distiller by cooling, washing the crystals produced with alkali and acid, and distilling or subliming the product. Alizarin, the dyestuff contained in madder, is made from anthracene, another coal-tar product, by the action of bichromate of sodium and sulphuric acid. Chemical action yields a compound of alizarin containing sodium, from which alizarin itself is made by the further action of acid. Bieberich scarlet, one of the naphthol azo dyes, a very important group is prepared, like indigo, from naphthalene as a starting material.

These examples will show how the chemical laboratory and the factory have replaced field cultivation for the production of dyestuffs. There are also thousands of new dyes prepared from benzene, toluene and carbolic acid, as well as many others from naphthalene. While these are usually all classed under the name "coal tar dyes," this term is somewhat misleading to the uninitiated, for it seems to imply that the dyes exist as such in coal tar, and only need extraction. The real significance of the term is, that coal tar contains the raw materials for dyestuffs, but these materials need to be transformed by chemical processes, often complicated, before anything of the nature of a dye can be produced.

Dynamics, that portion of physical science which treats of force and the laws governing it. There may be properly considered two phases of the subject: statics, which treats of forces acting but resulting in no motion; and kinetics, when motion is produced. To this latter only was the term dynamics formerly applied, the name mechanics being used for what is now known as dynamics. The three fundamental laws upon which the science of dynamics rests, widely know as Newton's laws of motion, are:

1. Every body continues in its state of rest or of uniform motion in a straight line unless acted upon by some external force.

2. Change of motion is proportional to the impressed force and takes place in the direction in which the force acts.

3. To every action there is an equal and opposite reaction.

The resistance which a body presents to a force is directly in proportion to its mass, a body weighing five pounds will offer five times the resistance of a body weighing one pound. Upon this principle the following law of dynamics is based:

The velocity produced in a body free to move without resistance in any unit of time will be directly proportional to the intensity or amount of the applied force and inversely proportional to the mass of the body.

All forces are subject to the same laws. Two units are employed in measuring force—the poundal, used in the English system of weights and measures and the dyne (which see) used in the metric system. The poundal is a unit of force which will impart to a mass of one pound an acceleration equal to one foot per second. The dyne is a much smaller unit and is employed in measuring delicate forces. It is the unit in the centermeter-gram-second (C-G-S) system of units. A gram of force is equal to 980 dynes.

That part of dynamics having to do with the application of forces to fluids is sometimes distinguished as hydrodynamics, with its subdivisions hydrostatics and hydrokinetics. Sometimes these terms are limited to liquids, the word pneumatics being used with the compressible fluids, the gases.

See MECHANICS; FORCE.

Dynamite, or giant powder, a preparation much used in blasting. The bursting or disruptive force of dynamite is about eight times that of gunpowder. It was invented by Nobel in 1866. It consists of some absorbent material soaked to its full capacity with nitroglycerin, and is designed to be safer in carriage and use. The best absorbent is a fine, white floury earth found in Hanover, which absorbs and renders safe about three times its own weight of nitroglycerin. The mixture resembles heavy brown sugar in appearance. It is molded into cartridges or sticks, and is coated with paraffine paper. It is safe against ordinary dropping and jars, but can be exploded by a sudden shock and flash like that produced by a percussion cap. It is difficult to explode frozen dynamite. Dynamite is used by the farmer in blasting out stumps, and by the miner in ledges. A stick of dynamite exploded in a hole drilled into a ledge will do the work of many men. Without dynamite railroad tunnels could be constructed only at enormous expense. In 1909 the engineers of the Lackawanna Railway reported that 5,000,000 pounds of dynamite would be required in blasting the way for a twenty-eight mile cut-off. In such a case the dynamite is made near the spot. In 1867, the year after its invention, eleven tons of dynamite were made. Now over 50,000 tons are made yearly in the United States alone. There are large factories in the hills east of San Francisco Bay. The largest dynamite factory in the world is near Ardeer, Scotland. Dynamite is sold at retail at from twelve to twenty cents a pound. Life insurance companies rank the manufacture of dynamite as the most hazardous occupation in the world. See NOBEL; NITROGLYCERIN.

Dynamo, or **Dynamo-Electric Machine,** the mechanism now mainly used for the generation of electric currents. It is a machine which transforms mechanical energy into electrical. The essential parts of a dynamo are a magnet and a coil of wire which is made to revolve in the magnetic field. The principle involved is that discovered by Faraday in 1831, that whenever a conductor cuts magnetic lines of force, a current is generated in the conductor. In all the larger dynamos, electromagnets are used, in which the magnetism is induced either wholly or in part by the current being generated. It is common to speak of the magnet as the field magnet and the rotating coil of wire as the armature. Since the direction of the current depends upon the direction in which the lines of force are cut, the resulting current is one which reverses in direction with each half revolution of the coil unless a special device, known as a commutator, is used to rectify it. This commutator consists of a number of metal segments insulated from

each other and from the axis, but which connect with the ends of the coils in the armature. Metal brushes, held against the commutator by springs, serve to conduct the current where it is to be used. Every time the current reverses in the armature, it is reversed in the brushes so that it remains constant in direction in the external circuit. A dynamo without a commutator is often called an alternator since it produces what is known as an alternating current. The term generator is often used as synonymous with dynamo.

Dynamos differ widely in pattern as well as size. A small one with a permanent magnet, such as is used in a medical battery, is known as a magneto. The simplest dynamo has but two magnetic poles when it is said to be bipolar; if several, it is called multipolar. In some larger machines the coil of wire is stationary and the field magnets revolve. Dynamos have been built capable of generating thousands of horsepower. It is well to note that dynamos do not create any energy but must have steam or water to produce the rotation. Instead of utilizing waterpower directly for motive purposes, it is now usual to generate electricity by dynamos directly connected to the turbine water-wheels, from which it may be readily distributed.

Dynamom'eter, an instrument used for the measurement of force. A simple form is the common spring balance. A dynamometer is often used to determine the pull of an animal or engine, the draught of a machine, such as a plow, or the strength of a wire or chain. The determination of the work done may be calculated by multiplying the force as indicated on the dynamometer by the distance through which the force acts; and dividing this product by the time taken to do the work gives the power, or the rate at which the work is done.

Dyne, the absolute unit of force, based upon the fundamental units of the metric system. It is the amount of force which will give to a gram mass in one second an acceleration of one centimeter per second. It is approximately equal to 1/980 of the attraction of the earth for one gram of matter. The corresponding unit in the English system is the poundal, which is the force required to give to a pound mass an acceleration of one foot per second. The latter is about 1/32 of the weight of a pound. There are 13,825 dynes in a poundal. See FORCE.

Dyspepsia, dis-pep'si-a or sha, a Greek word, the literal meaning of which is difficult digestion, and which designates a condition in which the functions of the stomach are interfered with. It may be caused by over-eating, by eating unsuitable food, by insufficient mastication, by eating when one is overheated, overtired, or suffering from mental strain, or by the excessive use of alcohol. The symptoms, any or all of which may be present, are discomfort or pain in the region of the stomach, coated tongue, loss of appetite, headache, flatulence, heartburn, nausea and mental depression. In mild cases of dyspepsia the symptoms amount to little more than discomfort, and last usually only a day or two. In severe cases they become much more pronounced and continue for several days or weeks. By far the greatest sufferers from dyspepsia are those whose condition has become chronic, through neglect of the warning given by the milder attacks.

Since individual cases differ widely it is impossible to name a cure. The sufferer must, in many cases, "work out his own salvation" by learning what food he may eat with impunity and under what conditions he may eat it. It is conceded generally that most people eat too much and eat too fast.

These habits are especially injurious to the dyspeptic. A small quantity of food, thoroughly masticated and eaten with no feeling of haste or anxiety, may be digested properly, while the same food eaten in haste or under mental strain will cause hours of suffering. The patent medicines advertised to cure dyspepsia contain, in most cases, large quantities of alcohol and afford temporary relief only, the distressing symptoms recurring later with increased severity.

E

Eads, ēēdz, **James Buchanan** (1820-1887), a celebrated American engineer. He was born at Lawrenceburg, Indiana, May 23, 1820. He died at Nassau, Bahama Islands, March 8, 1887. Perhaps no other American engineer has been connected with more notable enterprises. In young manhood he won a reputation by devising some barges for raising sunken steamers. In 1861, at the call of the Federal government, he constructed eight ironclad steamers inside of one hundred days. He also built other gunboats and mortar boats, all of use in opening up the Mississippi and its tributaries. In 1867-74 he built the famous Eads Bridge across the Mississippi at St. Louis. It is a mammoth steel arch structure of three spans, resting on stone pillars sent down to bed rock far below the bottom of a treacherous river. It cost $6,500,000. The last great work with which he was connected was the improvement of the mouth of the Mississippi. He designed the system of willow mattresses and stonework by which the water was confined to a narrow passage through which it scoured a deep channel. See BRIDGE; JETTY.

Eagle, a bird of prey belonging to the falcon or hawk family. The golden eagle inhabits the mountainous parts of Europe, India, Africa, and North America. It is still found in the Highlands of Scotland. It is the eagle which not only furnished the chieftain's plume, but of which so many thrilling stories are told concerning the carrying away and the hazardous rescue of children. Shepherds especially dread the vicinity of a nest of eaglets, to the support of which so many lambs must be sacrificed. They climb the most inaccessible cliffs to destroy an eagle's nest. The golden eagle is not infrequent in the Rocky Mountains, but it is seldom seen east of the Mississippi River. It may be distinguished by a yellowish head and neck, with legs feathered quite to the toes.

The bald eagle is so called from the whiteness of its head and neck, but it is not bald. As distinguished from the slightly smaller golden eagle, its leg is bare part way to the knee. This bird has been adopted as the national emblem. The length may be stated at 33 inches for the male and 35.5 for the female, with wing expanse of over 80 inches. Bald eagles breed throughout North America, nesting in trees not too far from water. They live chiefly on dead fish found along the shore, and on fish which they force the American osprey or fish-hawk to surrender. Pathetic tales are told of the fish-hawk winging home to its young with a hard earned fish in its talons, only to be intercepted by a lying-in-wait robber baron and forced to drop its fish, perhaps in sight and hearing of its hungry young screaming for supper.

Historically the eagle, species uncertain, is considered a noble bird, ranking with the lion, the king of beasts. Among ancients, the Persians and the Romans, and later France, Russia, Prussia, and Austria have adopted the eagle as a military symbol. It is to be regretted that traditional association of ideas should have led to the selection of a homely, greedy, lazy robber, with a maniacal scream,—the American bald eagle,—as the emblem of the United States. W. T. Hornaday, an appreciative and an intelligent observer of birds, takes the opposite view:

"Even when in flight, an eagle can be distinguished from all other birds by its slow and powerful wing-strokes, and the great breadth of its wings, especially near their extremities. To see one perching on the topmost branch of a dead tree, overlooking a water prospect, with its snowy head shining in the sunlight like frosted silver, is enough to thrill any beholder."

The eagle is frequently referred to in literature. Thus Smollett speaks of the spirit of Independence as "Lord of the lion heart and eagle eye." "Methinks I see," says Milton, "a noble and puissant nation as an eagle mewing her mighty youth and kin-

dling her undazzled eyes at the full midday beam." "On eagles' wings immortal scandals fly," is Juvenal's graphic metaphor.

See HAWK; FALCON.

He clasps the crag with hooked hands;
Close to the sun in lonely lands,
Ring'd with the azure world, he stands.

The wrinkled sea beneath him crawls;
He watches from his mountain walls;
And like a thunderbolt he falls.

—Tennyson.

Ear, the organ of hearing. In its simplest form, as seen in some of the lower animals, the ear is simply a sac of liquid, in which the end of the auditory nerve is expanded. The ears of the locust are situated on each side of the basal joint of the abdomen. The green grasshoppers and katydids hear through ears situated on their front legs. These ears look like little scars. The mosquito is believed to hear through sensitive spots on its antennae or feelers.

The human ear is rather complex. It consists of three divisions,—the outer, or external ear, the middle ear, and the inner ear, or labyrinth. The peculiar folds and passages of the outer ear are of service in catching sound, and also in enabling the hearer to determine from what direction it comes. The middle ear is an air chamber, communicating with the throat by an air passage or tube, called the eustachian tube. The ear chamber is separated from the outer and from the inner ear by membranes giving it the structure of a drum. Three small, movable bones, called the bones of the ear, reach from the outer membrane to the inner. The inner ear, or labyrinth, is filled with liquids. The auditory nerve, which comes from the brain, terminates here.

Sound reaches the brain as follows. The vibrations of the atmosphere set the outer membrane in motion. This agitates the bones of the ear. They set up a vibration in the inner membrane, which, in turn, shakes the liquids in the labyrinth, thus disturbing the ends of the auditory nerve, along which the sensation flies to the brain. A forceful vibration gives the impression of a loud noise. If agreeable vibrations come frequently, they give the impression of music. The human ear is able to note a sound having a frequency of from 32 to 38,000 vibrations per second. A rare ear can go to 50,000. The ear of a cat is capable of hearing an extraordinarily high note. No doubt the world, especially the insect world, is full of sounds quite intelligible to many ears, but unknown to the human ear.

The linings and the membrane of the outer ear are kept moist by the excretion of ear wax. When, as often happens, especially in old age, the membrane becomes dry and inflexible, and thus unable to vibrate, partial or entire deafness ensues. There are various devices for collecting the sound waves and increasing their intensity that may be used by those having defective hearing. See SOUND.

Earl, erl, in England, a title of nobility, ranking next below duke and marquis. The oldest son of an earl is a viscount. The coronet of an earl consists of a gold band or circlet, from which rise eight lofty rays of gold, supporting pearls. In shape these rays look something like the elevated eyes of a snail. Between each pair of rays is a gold leaf. The earl's coronet, like that of the duke's may be closed with a velvet cap, if so desired. The wife of an earl is called a countess. She is entitled to wear a coronet much resembling that of her husband, except that the rays are shorter. An earl is entitled to appear in the House of Lords wearing a scarlet robe trimmed with ermine. In writing to an earl, the sovereign addresses him as "True and well beloved cousin." See DUKE; PRECEDENCE.

Early, Jubal Anderson (1816-1894), a Confederate general. He was a native of Virginia. His education was received at West Point, from which institution he graduated in 1837. He served in the Seminole and Mexican Wars, and then took up the practice of law in his native state. He was sent to the legislature and was appointed State's attorney. When the Civil War broke out, though opposed to secession, he entered the Confederate Army as colonel, and helped to win the battle of Bull Run. He was in the battle of Gettysburg, as a major general, and in 1864, commanded in the Shenandoah Valley,

where he was defeated by Sheridan. Defeated again by Custer at Waynesboro he was relieved of his command, although he is still considered worthy of high rank among the soldiers of the Confederate Army.

Earring, an ornament suspended by a ring or hook passing through the lobe of the ear. In all historical times, earrings have been made of gold or silver adorned with precious stones. The earring is believed to be of oriental origin. Certainly its use was known among the most ancient nations. Originally it was, no doubt, worn as a charm to frighten away evil spirits. Among the oriental races earrings were in general use for both sexes. Among the Hebrews, the Egyptians, the Greeks and Romans, however, they were worn only by women. Among Europeans the wearing of earrings is now confined largely to the two extremes of society,—the bejeweled rich and the peasantry. One who has observed steerage passengers coming ashore at New York is struck by the large number of men, particularly Italians, who wear earrings.

Earth, the planet third in order from the sun. Mercury and Venus are nearer the sun. The general shape of the earth is spherical. Whenever the earth's shadow falls on the moon it has a circular outline. The curvature of the earth's surface is such that, if three stakes in a line be driven half a mile apart, so that the tops of the first and third are on a water level with the top of the second, it will be found, on sighting across, that a straight line from the top of the first stake to the top of the third cuts about eight inches below the top of the second stake. In other words the surface of a lake curves about eight inches per mile.

Scientists have actually made numerous measurements—a score or more—of considerable portions of a meridian, that is to say, a north and south line. One measurement extended from Hammerfest, in the north of Norway, to the mouth of the Danube; another from the Himalayas to the southern point of Hindustan. From these measurements it has been found that a degree of a meridian is 3,000 feet longer in Sweden than in southern India; in other words, that the earth is flattened at the poles.

Various computations agree so well that it is believed the following dimensions of the earth are correct, to within a fifth of a mile.

Equatorial diameter	7,926.614 miles.
Polar diameter	7,899.742 miles.
Difference	26.872 miles.
Average diameter	7,920 miles.
Equatorial circumference ...	24,912 miles.
Area of surface.....	196,971,984 sq. miles.
Weight in pounds including atmosphere 6,666,225,819,600,000,000,000	

The earth has three motions and possibly four:

1. It rotates on its axis once in each twenty-four hours. The rotary speed of the earth's surface varies from zero at the poles to one thousand miles an hour on the equator.
2. It revolves about the sun in an elliptical orbit once in each year, flying at a rate of about 66,600 miles an hour in its travels. This orbit is fairly regular, yet it is thought that the earth wobbles on its axis a trifle, and is jolted out of its path 4,000 miles or so.
3. It follows the sun in its travels at an estimated rate of 150,000,000 miles a year.
4. Very possibly the universe may be changing its position in space.

The density of the earth's crust is about three times that of water. The average density of the earth is 5.5 times that of water, from which it is argued that the interior is about eight or nine times as dense as water. Inasmuch as pressure tends to solidify, and heat tends to liquefy, it is not known whether the interior is solid or fluid; but it is pretty well agreed that the interior is dense and intensely hot.

See GEOGRAPHY; EQUATOR; ALTITUDE; LATITUDE; LONGITUDE; SEASON; PLANETS.

Earthenware. See POTTERY.

Earthhouse, a name given to peculiar underground dwellings found in northern Scotland and in Ireland. They are thought to have been the dwellings of the Picts. They are constructed, usually, of loose stone walls built upward and brought to-

gether until the top could be covered with large slabs. They were then covered with mounds of earth. As many as forty or fifty of these strange dwellings are found in a single group or village. The simplest dwellings, from four to ten feet in width, perhaps sixty feet in length, and deep enough to permit standing upright, have but one room; others, more pretentious, have a number of chambers. Naturally enough, they were constructed in dry ground. They were entered by a small hole in the top. Stone handmills, ashes, bones, deer's horns, round plates of stone and slate, earthenware cups, bronze swords, and gold rings have been found in these underground houses. It is thought that they may have served rather as places of concealment in time of danger than as regular dwellings. In some cases these underground villages are found beneath tilled land, where the plow has been passing above them for centuries.

Earthquake, a sudden movement of the earth's surface. The passage of a heavy railway train creates a vibration, differing from an earthquake chiefly in intensity. The causes of earthquakes are various. Sometimes an extensive crack forms in certain rock strata, and the rock on one side of the crack settles; or else the roof of an extensive subterranean cavity falls in. Other shocks originate in disturbances arising from an outburst of volcanic lava. It is thought that nearly all earthquake movements originate within the upper ten miles of the earth's crust, and most of them within two or three miles of the surface. The destructive influence of an earthquake shock is due rather to its extreme quickness than to the extent of vibration. It is believed that no earthquake vibration ever reaches a foot in amplitude, and that the earth's crust moves usually but a very small fraction of an inch. The nature of an earthquake shock may be illustrated by giving a table a sharp, quick, light tap with a hammer. A marble lying on the table will bound to a height of several inches, although the surface of the table cannot have vibrated, itself, more than one-ten-thousandth part of that distance. In this way a slight tremor or jar of the earth is quite sufficient to fling people out of bed, throw dishes out of a pantry, or bring stone walls tumbling down.

No part of the earth's surface seems to be entirely free from earthquakes, although they appear to have been more frequent or else better observed near the seacoast. The list of recorded earthquakes now includes about 7,000. In the year 1876, for instance, there were 104.

In 1755 the city of Lisbon was almost blotted out of existence by a sea wave caused by an earthquake. In 1811 an earthquake visited the Mississippi Valley. Five thousand square miles in the vicinity of New Madrid were lowered ten feet on an average. Productive farms were converted into hopeless swamps and the owners were forced to seek homes elsewhere. One of the most notable earthquakes in the United States occurred at Charleston, South Carolina, August 31, 1866. Nearly one hundred people were killed. Several million dollars' worth of property was destroyed. In 1868 the coast of Peru and Ecuador was swamped by huge waves created by an earthquake shock. They poured over the land with a depth of sixty feet. The city of San Francisco was damaged by the same series of shocks. In 1891 Japan experienced a notable earthquake. A crack was traced for a distance of forty miles. The earth and rock sank from two to twenty feet along one side of the crack. In 1897 an earthquake visited India. Myriads of fish were killed in the Ganges as though by an explosion of a dynamite cartridge.

On the morning of April 18, 1906, the region about San Francisco, California, was visited by a very destructive earthquake. The damage to public buildings in various towns of the vicinity was great. The destruction in San Francisco was simply appalling. Huge structures were shaken to the ground; water mains burst. To add to the horror, fire broke out. Between earthquake and flames, eight square miles of buildings were almost entirely destroyed. Many public buildings of the city, banks, hotels, an immense ferry station, and Chinatown were wrecked utterly. Two hundred

thousand people were driven out of their homes. It is estimated that the loss of life reached 452 and that $200,000,000 worth of property was destroyed. Later in the same year a violent shock was felt on the coast of Chile, at Valparaiso and elsewhere.

In 1908 a terrible earthquake visited southern Italy. A region about seventy-five miles in diameter, including the northeastern part of Sicily and the toe of Italy, literally shuddered and fell a few feet into the bed of the ocean. The shock was so terrific that almost all buildings within this territory were shaken to the ground. Messina and Reggio, cities rising from the water's edge, tumbled in ruins. Huge tidal waves came up, covering the debris with mud and washing thousands out to sea.

On December 16, 1920, a disastrous earthquake occurred in the province of Kansu, western China. The greater part of the province was devastated, ten sizable towns were obliterated, and about 200,000 people lost their lives, as many as were killed in the earthquake that occurred in Italy and Calabria in 1908.

The following is a partial list of the notable earthquakes:

NOTABLE EARTHQUAKES

Place	Year	Lives Lost
Catania, Sicily	1137	15,000
Syria	1158	20,000
Cilicia	1268	60,000
Naples	1456	40,000
Lisbon	1626	30,000
Ragusa	1667	5,000
Schamaki	1672	80,000
Port Royal, Jamaica	1692	3,000
Sicily	1693	100,000
Aquila, Italy	1703	5,000
Jeddo (Tokio)	1703	200,000
Abruzzi, Italy	1706	15,000
Algiers	1716	20,000
Palermo	1726	6,000
China	1731	100,000
Naples	1732	1,900
Lima and Callao	1746	18,000
Grand Cairo	1754	40,000
Kaschan, Persia	1755	40,000
Lisbon	1755	50,000
Fez, Morocco	1755	12,000
Syria	1759	20,000
Martinique	1767	1,600
Tauris	1780	45,000
Calabria	1783	25,000
Bolivia	1797	40,000
Naples	1805	6,000
Kutch, India	1819	2,000
Aleppo	1822	20,000
Murcia, Spain	1828	6,000
Canton, China	1830	6,000
Calabria	1835	1,000
Martinique	1839	700
Cape Haytien, S. D.	1842	5,000
Point-a-Pitre, Guadeloupe	1843	5,000
Great Sanger	1856	3,000
Calabria, Italy	1857	10,000
Quito	1859	5,000
Erzeroum, Asia Minor	1859	6,000
Mendoza, South America	1861	7,000
Manila	1863	1,000
Mitylene	1867	1,000
Peru and Ecuador	1867	25,000
Santander, Columbia	1875	14,000
Scio	1882	4,000
Cashmere	1885	3,000
The Riviera	1887	2,300
Yunnan, China	1888	4,000
Valparaiso, Chile	1906	1,500
San Francisco	1906	452
Kingston, Jamaica	1907	1,100
Sicily and Calabria	1908	200,000
Cartago, Costa Rica	1910	1,500
Turkey	1912	3,000
Sakura, Japan	1914	43
Sicily	1914	200
Central Italy	1915	29,978
Guatemala City	1917	2,500
Muguello Valley, Italy	1919	100
Porto Rico	1919	116
Mexico	1920	3,000
China	1920	200,000
Chile	1922	2,000

Earthworm, or **Angleworm,** a well known genus of worms including many essentially similar species. A large number of cutworms, silk worms, measuring worms, and army worms are not real worms at all. They are the young, the larvae—of corresponding butterflies, millers, moths, and flies of all kinds; but the earthworm once is an earthworm always,—a genuine worm, unchanged save in size from the time it hatches from the egg. The body is cylindrical, tapering to the tip, and slightly flattened at the rear end. It is covered with a soft, somewhat slimy skin. A straight digestive tube tract or intestine runs with out coil or twist through the center of the entire body. Between this inner tube and the skin, which may be called an outer tube, there is a space comparable to a hollow cylinder. This space, that is to say, the body, is divided by cross portions or braces into many rings or segments easily counted by the corresponding bands which encircle the body. As high as 120 segments have been found. The jaw of a vertebrate

animal works up and down. The lips of the earthworm open, not up and down, but sidewise. The mouth slit is not horizontal; it is vertical.

Under the skin a double set of muscles is found. One long set runs lengthwise; the other, a circular set, runs around the body. When the worm desires to shorten its body it shortens the long muscles. When it desires to extend its body it shortens the circular muscles literally squeezing its body out lengthwise. The under part of the body is furnished with short, stiff bristles, four pairs to a segment. These bristles are controlled by muscles and may be set to point forward or backward, or they may be drawn up into little pits where they are not noticeable. If the body be drawn up short by the long muscles, and the bristles be pointed backward, the body will be pushed out forward when the circular muscles act. If, under similar conditions, the bristles are pointed forward, the body is extended backward and retreats. On a surface so theoretically smooth that no foothold could be obtained, the body would extend equally in either direction, and no change of place could be made. The same is true of a person, however, or of any animal. Locomotion is effected by gaining a foothold and pushing the body forward, an interesting operation to observe.

The earthworm has a nervous system. A double nerve cord, with an enlargement in each segment, runs beneath the intestine and ends in a sort of brain in the shape of a ring or collar surrounding the swallow. There is no evidence that an earthworm can hear. It has no eyes; yet it is sensitive to light and can tell the difference between day and night. Without doubt the sense of touch is well developed, as well as that of heat and cold. It seems also to have a sense of smell.

The body is provided with a regular system of blood circulation. The chief organs are a tube running the length of the back and another following the lower surface, through which the blood is driven by muscular action of the tube walls. The blood is red, due to coloring matter in the liquid itself, not to floating bodies as in the case of man.

The entire skin serves as lungs. Living bloodvessels lie in the surface, separated from the air by a thin membrane only. As long as this membrane is moist, air passes; but if an earthworm be kept in warm, dry air, the surface of the body dries and the animal smothers for want of air.

The home of the earthworm is a burrow,—a slender hole going down, it may be several feet, always into moist earth, and in the winter time below the reach of frost.

The chief food is earth, from which the worm extracts vegetable and animal matter. The spiral heap of fine earth found about the entrance to its burrow is the earth which the worm has eaten and then voided or cast away. Leaves are frequently dragged into burrows to be eaten when half decayed. The worm has mere lobes for lips or jaws, no real mouth cavity. The work of boring burrows and of seizing leaves is done by the muscular end of the swallow or pharynx.

The earthworm is an animal of agricultural importance. By boring deep it forms tubes which admit air and rainwater to the soil. Burrowing mellows the soil. The castings may seem trifling, but investigations undertaken by Mr. Charles Darwin of England go to show that, in a grassplot well peopled by earthworms, their castings amount to an inch in five years, or twenty inches in a century; enough in the course of time to bury a city. Mr. Darwin is of the opinion that in many parts of England no less than ten tons of soil are eaten and brought to the surface per acre each year. The grinding that takes place in the gizzard of the earthworm produces rock flour of fineness and fertility.

See SOIL.

Earwig, a long, narrow insect resembling the beetle in some respects. The mouth is formed for biting. The wing covers are short; the hind wings are very peculiar. The base of the wing is furnished with ribs like those of a Japanese fan. These are folded together fan fashion. The broad end of the wing is then folded twice crosswise, so as to shorten or crinkle it up. The tail end of the body has a pair of appendages resembling forceps. Earwigs are found on

the Pacific coast and in the Gulf States, but are rare in the northeastern part of the United States. In Europe they are very troublesome in the flower and the vegetable garden. They eat the corollas of flowers and devour the tender parts of vegetation generally. There are specimens of 200 different species in the collection of the British Museum. The common name is derived from a popular belief that this insect is prone to crawl into the ear of a sleeping person.

East, in geography, the direction of the rising sun. The east has been invested with a certain sacred character from the earliest times. The ancient pagans placed their altars in the eastern part of their temples, that they might sacrifice to the rising sun. From time immemorial it has been customary among many peoples to bury with the feet toward the east, in order that the dead may face the rising sun. Although the Mohammedan prays with his face toward Mecca, in whatever part of the globe he may be, it has long been the custom among Christians to build their cathedrals with the choir toward the east. The traditional source of civilization is in the east. The wise men of the Scriptures came from the east. "Westward," not eastward, "the star of empire takes its way." Mathematically considered, a line drawn east and west is everywhere parallel to the earth's equator. That being the case, each parallel on the earth's surface has its east in a direction of its own. The two poles, however, have neither east nor west.

East Africa, German, now **Tanganyika Territory,** a British possession lying on the African coast directly south of Kenya Colony. The German rights were acquired from the Sultan of Zanzibar in 1890 by a payment of $1,000,000. Area 365,000 square miles. Population, chiefly Bantu, 4,000,000. The major part of German East Africa by the Treaty of Paris (1919) goes to Britain, the eastern and southern coasts to Belgium and Portugal, respectively. See AFRICA.

That part ceded to Great Britain now bears the name of Tanganyika Territory. The Territory is rich in valuable forests of ebony, wild rubber, gum copal and cedar. Large areas are successfully cultivated, producing sugar cane, cotton, coffee, caoutchouc, cardamon and cinchona; fiber plants such as sisal are especially easy to grow here. The live stock of the Territory consists of about 3,000,000 cattle and 5,000,000 sheep and goats. Coal, iron, gold, lead, copper, mica and salt are found, as well as agates, topaz, moonstones, quartz crystals and garnets, the latter in large quantities. There are a number of good harbors, and a considerable trade is carried on. In 1921 the imports were valued at about $5,000,000, and the exports at slightly less. There are 1,000 miles of railroad in the Territory, but wagon roads are few and poor. The government schools number forty-five and are attended by over 3,500 children. See AFRICA.

East African Protectorate, a large area, formerly controlled by the British Empire, was annexed by the Empire in 1920 and named Kenya Colony. The Colony has an area of 245,060 square miles and a population of 2,630,000, including 9,650 Europeans.

The coast extends from the Umba River to the Juba River; the territory goes inland as far as Uganda.

The largest town in the colony is Mombasa, having a population of about 40,000. British government expends about $10,000,000 a year on the colony, and reand wax. The principal imports are cotton goods, rice, flour, tools, wines, spirits, groceries and tobacco. The Colony has a railway 618 miles long, along which runs a teleghaph line, and is also fairly well provided with roads. Mombasa has cable connection with Zanzibar. There are seven government schools in the Colony, attended by about 800 pupils. See AFRICA.

East India Company, a name given to various companies chartered by their respective governments to acquire territory and carry on mercantile operations in the East Indies. Most of these companies date from about the time of the discovery of America, or more particularly the discovery in 1498 of the route to India around the Cape of Good Hope. Among

the more noted companies were the Portuguese, operating from 1587 to 1640; the Dutch, from 1595 to 1795; the Danish, from 1618 to 1845; and the French, from 1664 to 1769.

As ordinarily considered, the East India company may be taken to refer to an English company chartered by Queen Elizabeth in 1600. It consisted of 125 stockholders. Its legal name was The Governor and Company of Merchants of London Trading with the East Indies. The operations of this company were extensive and resulted in great financial gain to the merchants of London. Various acts of Parliament permitted the company to assume almost imperial power in the East. Immense territory was acquired. Large armies, both of native and British troops, were kept under pay. Extensive warehouses and wharves were constructed, and a merchant fleet, far surpassing in number the Spanish Armada, was maintained. As the business of the company grew, and the amount of territory increased, the British government found it necessary from time to time to assume control of the company's affairs. Finally it was dissolved, its affairs were wound up, and the commerce of the East Indies thrown open, not only to all British vessels, but to the merchants of all nations. Historically, the company is of great importance, because its projects led to the acquisition of India by the British government, and did more, perhaps, than any other known artificial factor to determine the career of England as the leading commercial nation.

See INDIA; HASTINGS.

East Liverpool, Ohio, is situated 44 miles northwest of Pittsburgh on the Ohio River, and the Pennsylvania and the Youngstown & Ohio railroads. It is connected by bridges with Newell and Chester, W. Va., and has boat line connections with all important Ohio River points. This city is the most important center in the United States for the manufacture of porcelain, including porcelain electrical supplies, floor tile and porcelain dinner ware. Here also are brick works, a sewer pipe factory, glass works and machine shops. There are fine graded schools and a Carnegie library. The population in 1920 was 21,411.

East St. Louis, an important industrial city of Illinois, is opposite St. Louis, Missouri, with which it is connected by the Municipal, Merchants', McKinley and Eads bridges. It is the third city of Illinois, having increased in fifty years from a town of about six thousand inhabitants to a city with a population in 1920 of 66,767. East St. Louis is served by the Baltimore & Ohio, Wabash, Chicago & Alton, Mobile & Ohio, Pennsylvania, and nineteen other railroads; and by numerous river boat lines and interurban railways. Located near the valuable Illinois coal fields, East St. Louis is an ideal location for large-scale industry. The industrial plants of the city produce locomotives, steel rails, malleable iron, railway-car supplies, flour, rolling mill products, foundry products, baking powder, packing house products, and a host of other commodities. The public school system is thoroughly modern, and there is a public library, parochial schools and a Catholic Academy. See EADS; ST. LOUIS.

Easter, ēs′ter, a festival celebrating the resurrection of Jesus Christ. By general agreement Easter Day fell on a Sunday; but for centuries, owing to changes in the calendars and other causes, there was confusion as to which Sunday should be thus observed. The rule adopted by the Roman Catholic church and by the Church of England is that Easter Day is the first Sunday following the Pascal full moon. This full moon is the one that occurs on or after March 21st. If the full moon occurs on Sunday, March 21st, Easter is the Sunday following, or March 28th. Even this ruling gives a wide range for the date of Easter. In case the full moon should occur on Saturday, March 21st, the following day, March 22d, would be Easter Sunday, the earliest date possible. In case a full moon should fall on Monday, March 20th, the Pascal, which is the first full moon after the 21st, would not occur until four weeks later, on April 17th, bringing Easter Sunday on April 23d. This is the latest date possible. In 1905 Easter fell on this date. Easter

closes the forty days of Lent. Its solemnities are supposed to usher in gaiety in fashionable circles. The flower of the season is the beautiful white Easter lily. Florists have developed great skill in bringing this flower into full bloom at the right time. The habit of presenting Easter eggs to one's friends is a custom thought to have been derived from the Persian magi, the egg being the symbol of creation, birth, or resurrection,—possibly the re-creation of spring. Dyeing the eggs is a Christian addition; red, in particular, symbolizing the blood of the redemption.

Eastern Star, an auxiliary order or secret society to which Free Masons and the wives, mothers, sisters, daughters, and widows of Masons are eligible. The first chapter was organized in New York in 1868. There are now twenty-eight grand chapters in as many states and over 100,000 members. The emblems of the order is a five-point star. See MASONS.

Easton, Pa., the county seat of Northampton Co., is situated at the forks of the Delaware where the Lehigh enters, 65 miles north of Philadelphia. It is connected by a bridge with Phillipsburg, N. J., and by canals with the adjacent coal fields, with New York and with Philadelphia. This city was the scene of several important treaties with the Indians between 1756 and 1762, during the French and Indian War. It is near to, and is the commercial center of, a mining region that produces iron ore, cement, soapstone, slate and building stone. Important among its manufactures are silk, hosiery, knit goods, bricks, flour, tile, paint, school crayons, air-pressure drills, machinery and pianos. It is the seat of La Fayette College. It has also a Carnegie library and modern graded schools. Population, 1920, 33,813.

Eau Claire, Wis., the county seat of Eau Claire County, is situated at the junction of the Eau Claire and the Chippewa rivers, 89 miles east of St. Paul, Minn. The Chicago & Northwestern, the Chicago, Milwaukee & St. Paul, and the Minneapolis, St. Paul & Sault Sainte Marie railroads enter. Water power developed by both rivers turns the wheels of factories manufacturing shoes, harness, paper, refrigerators, automobile tires, sashes and doors, furniture and steel and iron products. Eau Claire is at the head of navigation on the Chippewa River, and is the outlet of the Chippewa lumber district. It contains a Carnegie library, and has fine public schools. It was the first city in Wisconsin to adopt the commission form of government, 1910. The population in 1920 was 20,906.

Ebers, Georg Moritz (1837-1898), an eminent German scholar and novelist. He was a remarkable student when a young man. In early life he began to apply himself to the study of ancient remains in Egypt. In 1868 he was appointed professor of Egyptian language, history, and antiquities at Jena. Two years later he became professor of Egyptology in the University of Leipsic. He visited Egypt repeatedly and was instrumental in making excavations revealing numerous specimens of Egyptian art, and in the discovery of valuable papyrus manuscripts. His university duties were but nominal. He wrote a large number of works relative to Egypt, in which he discussed the manuscripts, statuary, architecture, and hieroglyphic inscriptions. Among his writings is a popular work called *Egypt in Picture and Word.* He also wrote a series of novels descriptive of ancient Egyptian and Syrian life. The more noted are *An Egyptian Princess, Uarda, Homo Sum, The Sisters, Serapis,* and *Kleopatra.* At the time of his death, he was, as might be expected naturally, the leading authority on all matters pertaining to ancient Egypt.

Ebert, Frederick (1871-), a noted German Socialist, who in 1918 succeeded Prince Max of Baden as Chancellor of the Empire and who was chosen President of the German Republic. He was born at Heidelberg, of working class parents, and in his youth worked as a tailor. Later he succeeded in purchasing a small printing plant and began to contribute to the Bremen press. Arising to prominence among the German Socialists, Herr Ebert was elected to the Reichstag in 1908. He missed no opportunity to discuss the mili-

tary budget and to urge the claims of Socialism. He was elected president of the Socialist group in the Reichstag in 1916. Against the wishes of the Socialists of the extreme Left, he defended the German submarine campaign. Presiding at the Socialist Congress at Wurzberg in 1917, Herr Ebert was appointed leader of the Socialist majority, and was spokesman of this group in its vacillating attitude toward the war. In September, 1918, it was Herr Ebert who appealed to the Reichstag for peace and who issued the proclamation demanding an armistice.

When the new government was organized he had more influence with the public than Scheidemann, Haase, Barth or his other colleagues. The Independent Socialists turned against him, however, and there occurred the Spartacist revolts which he had to crush with force of arms. Herr Ebert was declared President of the German Republic by the National Assembly in March, 1919.

A more difficult situation than that which faced President Ebert cannot be easily imagined. At home a general unrest pervaded the people, and during 1920 riots were not infrequent. The Kapp-Leutwitz revolt necessitated stern measures on the part of the government. Lack of raw material crippled manufacturing industries, and the currency of the country was rapidly depreciating.

Foreign commerce had to be regained, no easy task. The reparation question was a source of constant friction between Germany and the allies. During these trying years President Ebert was able to hold the government together and establish the republic on stable foundation. Under his guidance the country in a large measure, restored its industries and reestablished its pre-war relations with most foreign countries.

Ebony, a name given to various woods. They may be described as heavy, dark, hard woods suitable for carving, ornamental cabinet work, canes, and musical instruments. The ebony family, which, it may be noted, does not contain all the woods known in commerce as ebony, comprises several genera and about 250 species of shrubs or trees. The most valuable of the ebony trees belong to the genus *Diospyros,* and are confined to the warmer regions of the world, particularly to Asia, Mauritius and Africa. One species of this genus is the Virginian, or common persimmon. The most noted ebony, that having the blackest and finest grain, is obtained from the forests of Mauritius and Ceylon. Logs two feet in diameter are not unusual. A Japanese persimmon, cultivated for its fruit, also yields wood much prized by the Japanese artists for carving. A Jamaican tree, belonging to the legume family, furnishes a green "ebony," which takes a beautiful polish and is much used for inlaying. A dark brown "ebony," having the qualities of genuine ebony in all but color, is obtained from the forests of British Guiana. Genuine ebony takes a polish like ivory, and is almost as hard. See PERSIMMON.

Echidna, ē-kĭd′nȧ, a family of quadrupeds found in Australia and New Guinea. The echidna is related to the famous Australian duckbill and, like it, resembles several different animals. Its nose terminates in a narrow, horny beak. Its back and sides to its very toes are set thickly with strong spines. There are two species, one with three toes, one with five. Both are strong diggers and are able to conceal themselves in loose earth in an incredibly short time. Like the duckbill, the echidna lays eggs in a burrow, and keeps them warm, bird fashion, until its young are hatched. It is about the size of a hedgehog, much smaller than a porcupine. It lives chiefly on insects, which it catches with a long, sticky tongue. See DUCKBILL.

Echo, ĕk′ō, in Greek mythology, a beautiful nymph of the woodland hills. She was an attendant upon Artemis, the huntress. Her chief failing was a habit of talking too much and of insisting on having the last word. One day Hera was seeking her wayward husband, Zeus, whom she had reason to believe was disporting himself among the nymphs. Echo managed to detain Hera in conversation until Zeus made his escape. In her anger Hera deprived Echo of all power of speech save reply, that is, she left her only the last word. Echo fell in love with a beauti-

ful youth named Narcissus. She followed him in the chase, waiting for him to speak that she might reply. At length the opportunity came, but Narcissus did not return her love. In her grief she faded and pined away until nothing was left but her voice, which may still be heard wandering in the mountains, speaking only when spoken to, and replying only in the exact words of the speaker.

Echo, a sound returned to its source. If a person speaks against a wall or cliff the wave of sound is sent back again, and the speaker hears the sound of his own voice as though someone in the distance were calling to him. Under ordinary conditions sound travels at a rate of 1,080 feet per second. The time elapsing between the call and the return of an echo gives a clue to the distance of the reflecting surface. The reflecting surface must be a concave or, if flat, it must stand squarely across the path of the sound, or else the sound wave will glance off in another direction and fail to return to the speaker. Many caves and mountain passes have celebrated echoes. Some public halls echo to such an extent that it is difficult to address an audience. In such cases cloth hangings are a help.

Eclipse, ē-klĭps′, a term applied to the cutting off of the light of the sun from a heavenly body. An eclipse of the moon is caused by the passing of the earth between the sun and the moon. The moon is in the earth's shadow. An eclipse of the sun is caused by the passing of the moon between the sun and the earth. The earth is in the moon's shadow. The observer cannot see the sun for the moon. Since the earth is smaller than the sun its shadow comes to a point 857,000 miles away. At the point where the moon passes through the shadow its width is about two and two-thirds times the diameter of the moon. It is possible for a total eclipse of the moon to last about two hours. Even during a total eclipse the moon is not entirely obscured, but shines with a dull, copper-colored light. For a similar reason the shadow of the moon is also a cone, averaging 232,000 miles in length. At times the moon is farther than this from the earth, and it is not possible for an eclipse of the sun to take place. When conditions are most favorable, the earth enters the moon's shadow at a point where the cone is 168 miles in diameter. A total eclipse of the sun is possible, therefore, only along a belt of this width. As a matter of fact, the region within the moon's shadow is usually an oval figure having this length, but having a width not to exceed sixty or seventy miles. During a total eclipse the disc of the sun is entirely concealed within the limited region mentioned.

The track of this oval shadow across the continent is called the belt or path of the eclipse. The greatest number of eclipses possible in any one year is seven. The lowest number possible is two. The usual number is four. In 1917 there were four eclipses of the sun and three of the moon. In 1935 there will be two of the moon and five of the sun. As a total eclipse of the sun affects but a small area, any particular portion of the earth's surface is likely to be within its path only once in about 360 years.

The last total solar eclipse visible in the United States occurred in 1923. Subsequent dates are 1925, 1930, 1945, 1954, 1979, and 1984. Whether partial or total, an eclipse is an interesting phenomenon. During a lunar eclipse the moon assumes a weird, spectral appearance. During a solar eclipse the blackness which comes over both the sun and the earth is truly appalling. According to a statement of a writer who was an eye witness of a solar eclipse visible in the southern states during the early half of the nineteenth century, the blackness of the landscape was almost beyond description. Cattle roamed the pastures or stood in astonishment; chickens went to roost. Negroes prostrated themselves in terror and cried for mercy, thinking the end of the world was at hand.

Astronomers seize upon a solar eclipse as a favorable opportunity to study the sun. Scientific expeditions are sent out from learned institutions to the favored region, even to remote parts of the world, when a total eclipse is due. The work

of observing an eclipse is now systematized thoroughly. The most important duty during the hour is that of taking photographs for future study.

See SUN; MOON.

Ecliptic, the apparent annual path of the sun through the heavens. There are as many stars in the sky in the daytime as at night, only we cannot see them. The sun is in company with stars all the time, only we cannot see them. By a careful study of the heavens we shall see that the stars that apparently travel, rise, and set with the sun in December were not his companions in November and will not be his attendants in January, but will be with him in December again. The stars in a belt running entirely around the heavens in a great circle take turns in accompanying the sun; or, put in another way, the sun seems to go around this belt once a year. As a matter of fact the earth goes around the sun, but, by watching the stars, it seems to us that the sun is passing around the heavens. When one rides in a train, a telegraph pole, a distant tree, or a hill seems to pass along the landscape, when in reality the tree and the landscape are at rest, and the observer is moving. So in our case, the sun and heavens are at rest,—we are moving. The line which the sun seems to follow round and round each year is called the ecliptic. A belt of stars lying along both sides of the ecliptic is called the zodiac. See ZODIAC; CONSTELLATION; STAR.

Eclogue, ĕk′lōg, as commonly used, a pastoral poem in which shepherds are introduced as conversing with one another. The word originally meant "selections," or "elegant extracts." In this sense it was applied often to poems of the same form. The satires of Horace, for instance, were called eclogues. The bucolics or pastoral poems of Virgil were called eclogues, probably by grammarians, and not by Virgil himself. Since Virgil's beautiful poems were called eclogues the term has come to signify a poem which is not only of a pastoral nature, but which is elegant in form, highly wrought, and exquisitely finished. The term has been applied to many poems of inferior merit.

École des Beaux Arts, ākŏl′dā bō-zähr, a school of fine arts maintained by the French government, where all students between the ages of fifteen and thirty may receive instruction free. The school, founded in 1648 by Cardinal Mazarin, is considered perhaps the best of its kind in the world. There are 1,300 students, most of them French. Of the foreign students, however, the greatest number is sent by the United States. Courses are offered in painting, drawing, sculpture, architecture, engraving, modeling, and gem cutting. The school offers a celebrated scholarship, the *prix de Rome,* founded in 1666. The winners of it receive an allowance from the state for three or four years, at least two of which must be spent in the study of antique art at Rome. The prize may be competed for by any French artist between the ages of fifteen and twenty-five, whether or not he be a student at the school. See MAZARIN.

Ecology, ē-kŏl′ō-jy, a name given, in botany, to that division of the subject dealing with plants in relation to their surroundings. There are two distinct aspects of the subject. The first deals with the individual plant and the changes it undergoes in adapting itself to its environment. For example, a plant visited often by a certain kind of insect may change the shape of the blossom so that in time, it will better accommodate that insect. A tropical plant, the "Monstera," which receives an oversupply of rain has developed wide, umbrella-like leaves with openings several inches long and an inch or more wide to let the water through. A plant removed from comparatively moist to dry soil will develop long tap roots which go in search of water. Any change in environment will result eventually in the modification of some part or parts of the plant. The second phase of the study treats of plants as gathered in groups, called plant-societies. Plants do not grow at random, but group themselves into definite communities, such as swamp-societies, desert-societies, meadow-societies, etc. This peculiar grouping is due to combinations of various factors, among them water, soil, light, wind, and temperature. See BOTANY.

Economics, or **Political Economy,** according to one definition, the science of wealth. It deals with the wealth-getting and the wealth-using activities of man. As used today by the majority of English students of the subject, the term economics includes a study of the laws governing the production, distribution, and consumption of wealth, and of how to apply these laws to everyday life so as to better existing conditions. It is not, of course, an exact science, for men cannot be depended upon always to do the same thing under the same conditions; yet it has been observed that when men are taken collectively, and their actions under given conditions are studied, from the results of this study certain general laws can be formulated which are true of the majority. For example, such study has enabled economists, or students of economy, to discover the principle that luxury, the excessive consumption of goods or articles which satisfy human wants, is wasteful, and that no man should claim a fuller satisfaction of his wants than is accorded to the rest.

Production treats of the supply of labor, of raw material, and of capital in their relations to each other. Distribution deals, not with the location of goods but with their division among the factors which produced them. For instance it would include a study of the question as to how much of the price brought by a pair of shoes should go to the manager of the factory, and how much to the workman who actually made the shoes. Consumption, or the using of goods, would involve such a question as whether an individual has the right to spend more than he needs for the satisfaction of his real wants, both physical and intellectual. A fourth department of economics is exchange, which treats of money, price, value, currency, and the like. Under this head would be asked such questions as: Is paper money safe? Is the silver standard practical?

The study of economics in its relation to everyday life is a fascinating one. It involves the question of labor unions, and how far they have a right to carry their demands, of public ownership of railroads and other public service corporations, of the organization of the banking system—in fact, it touches very many of the leading questions of the day.

Ecuador, ĕk-wä-dōr′, a republic of South America. The name is Spanish, meaning the equator, under which Ecuador is situated. It lies on the Pacific coast between Colombia and Peru. The boundaries are in dispute. The present territory administered by the government of Ecuador comprises about 120,000 square miles. When Pizarro and his men invaded South America, the Indians of Ecuador and Peru were at war, thus facilitating the conquest of their country. Ecuador obtained its independence of Colombia in 1830. Like that of other South American republics, the present government is organized on the model of the United States. Free public schools have been organized; a university, thirty-seven colleges corresponding to high schools, and several hundred primary schools are maintained at public expense. The public schools are seldom held in schoolhouses. They are without proper school furniture. Quito, the capital, is situated at an elevation of 9,600 feet above the sea. It is the highest capital city in the world. For fear of earthquakes there is not a stove, stovepipe, or chimney in town. The cooking is done in pots and kettles over a charcoal fire. Guayaquil, on the gulf of that name, has an excellent harbor, and is the commercial city of the republic. A railway from the harbor to Quito is under construction. The engineering difficulties are great, for the surface is exceedingly mountainous. This railroad will pass near the famous Mt. Chimborazo, and Mt. Cotopaxi, the loftiest volcano known.

The chief industries of the country are mining, stock raising, dairying, lumbering, and the production of cacao, coffee, sugarcane, tobacco, grain, and grapes. There are also manufactures of pottery and hats. The women of Quito are famous for making exquisite laces. The leading exports are cacao or cocoa, coffee, hides, meats, and the Peruvian bark from which quinine is extracted. Vanilla, sarsaparilla, cotton, rubber, pearls, vegetable ivory, and straw hats are also exported.

The population is given in the *Statesman's Year Book* as 2,000,000. Spanish is the prevailing language. The inhabitants are chiefly of the Catholic faith.

STATISTICS. The following are the latest reliable statistics available:

Area, square miles	116,000
Forest area, square miles	90,000
Population, estimated	2,000,000
Guayaquil	93,851
Quito	70,000
Cuenca	30,000
Riobamba	12,000
Number of provinces	18
Members of senate	32
Members of chamber of deputies	48
National revenue	$10,000,000
Bonded indebtedness	$30,000,000
Cocoa beans, pounds	2,517,000
Tobacco, pounds	3,000
Cotton cloth, yards	610,000
Woolen cloth, yards	100,000
Imports	$20,000,000
Exports	$25,000,000
Coffee, pounds	3,729,450
Rubber, pounds	886,373
Miles of railway	413
Number of schools	1,716
Pupils enrolled	103,344

Edda, either of two works in the Old Norse, or Icelandic languages; the *Elder,* or *Poetic, Edda,* consisting of mythological and heroic songs, probably composed between the 10th and 13th centuries, and the *Younger,* or *Prose, Edda,* treating of the Norse mythology, language customs and manners, the authorship of which being usually ascribed to Snorri Sturlison (1179-1241). The word *Edda,* its early significance and use, has been the subject of much discussion and controversy. It is not found in any of the dialects of the northern languages. It appears first in an old song in the collection of the *Elder Edda.* In content, however, the two *Eddas* are similar to the German *Niebelungen Lied,* and relate the wars of defeat and success, the loves and hates, of a virile, wild and primitive people, told in heroic verse.

The speculations about the two *Eddas* have been many. One idea is that these old songs and tales were looked upon as the source or mother of more modern poetry. The word edda is found in the inscription on one of the manuscripts of the *Younger Edda,* but why it was so called is not very clear. Gudbrand Vigfusson, a Danish authority of high rank, states that from 1340 to 1640 the word edda is used by poets as a synonym for the technical laws of poetic composition. This would imply that the *Younger Edda* was so called from that portion of the manuscript which sets forth these laws of prosody.

The *Younger Edda,* and the only one known up to 1642, is also called the *Prose Edda* and the *Snorra Edda,* or *Edda Snorra.* It is believed by scholars to have been composed, in part at least, between the years 1140 and 1160, more than a hundred years after the introduction of Christianity into Iceland. Snorri Sturluson, a learned Icelander, who lived in 1178-1241, and from whom the Edda takes the name of *Snorra Edda,* arranged, modified, and added to the work of the earlier authors. Several manuscript copies of the *Snorra Edda* are in existence, the oldest of which dates from the early part of the fourteenth century. This Edda was first printed in 1665. It has been translated into French, German, and English. It is written largely in prose and consists of five parts, as follows:

1. A preface which shows plainly the influence of Christianity giving as it does a history of the world from the time of Adam and Eve down to the kings of Norway and Sweden.

2. The fooling of Gylfe. Gylfe is a king of Sweden and this part of the Edda consists of stories of Norse mythology. It is the most valuable record of the mythological system of the Scandinavians.

3. Brage's Talke or Sayings of Brage. These are also legends of the gods. Brage or Bragi was the god of poetry.

4. This is the longest of the five parts of the Edda. It is a treatise on the art of poetry, commonly called Skálda. It claims to consist of instructions given by Bragi. It contains, interspersed throughout the rules, and illustrative of them, two hundred forty poetic quotations and ten longer poems, among which are found many of the best examples of northern poetry. In many ways this is the most important part of this Edda.

5. A commentary on three of Snorri's poems, written in honor of Hakon, King of Norway.

The *Elder Edda,* known also as *Samund's Edda* and the *Poetic Edda,* was wholly unknown until 1642. At this time an Icelandic bishop, Brynhulf Sveinsson, discovered an old vellum manuscript containing a collection of songs about Norse gods and heroes. He called it, somewhat unfortunately, *Samund's Edda,* believing that the songs had been collected by Samund the Wise, a Christian priest of the eleventh century. The discovery of this manuscript awakened great interest in Scandinavian literature. It led to the printing of the *Younger Edda* and to researches which brought to light a large number of songs and sagas of great value in the study of the northern nations. Later authorities are convinced that Samund had nothing to do with the collection, that the songs were put into writing from oral tradition as late as the thirteenth century, and that the oldest of the songs could not have been composed earlier than the ninth century. The subject matter of myth and legend, however, may be much older. One thing is certain. These songs were collected in Iceland and by an Icelander. In order to understand something of the sources of this collection, it must be remembered that Iceland was peopled, probably in the ninth century, by Norwegians who fled from the oppression caused by the introduction into their country of feudalism. They brought with them their skalds or bards. They brought also their religious beliefs, their legends and traditions, perhaps songs and hymns which they had loved in the old home. For a century they retained their pagan beliefs. Then the island was converted to Christianity. Two or three centuries later someone foresaw the value of these old songs which had grown up and been preserved by oral transmission, or else had a passion for what was old, and collected them in writing. Meanwhile the religion of Odin had disappeared from the mainland also, and with it had gone the songs and stories which would have been lost but for their preservation in Iceland.

The *Elder Edda* consists of thirty-eight songs and is divided into two parts. The first part contains all the poems relating to the creation of the world, the origin of man, and the happiness or misery of the future life. It also contains those poems which recount stories of the gods. The first poem is the most remarkable and probably the most ancient. It is called the Völuspa, which means the Prophecy of the Völva or Sibyl. "She sings of the world before the gods were made, of the coming and of the meeting of the Aesir, of the origin of the giants, dwarfs, and men, of the happy beginning of all things, and the sad ending that shall be in the chaos of Ragnarök."

The second part of the *Elder Edda* contains a long series of poems relating to the two heroic families of the Völsungs and the Niblungs. These stories are universal among Teutonic peoples. They form the foundation of the Niebelungen Lied of the Germans. No translation can give an adequate idea of the early Norse songs. A few selections, however, may be of interest. They are from the translation of R. B. Anderson. Longfellow has written a poem, *The Challenge of Thor,* after the manner of these Icelandic songs, commencing:

I am the God Thor,
I am the War God,
I am the Thunderer!
Here in my Northland,
My fastness and fortress,
Reign I forever!

The golden age of the gods, when
On the green they played
In joyful mood,
Nor knew at all
The want of good. . . .
Of Ymir's flesh
Was earth created.
Of his blood the sea,
Of his bones the hills,
Of his hair trees and plants,
Of his skull the heavens,
And of his brows
The gentle powers
Formed Midgard for the sons of men;
But of his brain
The heavy clouds are
All created. —*Eddas* (Anderson).

Eddy, Mrs. Mary Baker (1821-1910), the founder of the Christian Science denomination. She was born at Bow, New

Hampshire, the youngest of six children. Her parents were intelligent, conscientious people, the mother a capable woman of placid temper and marked spirituality, the father known for his strict integrity and iron will. As a child Mary was considered a prodigy in the neighborhood, partly on account of the studies she pursued with her brother Albert, ten years her senior, and partly because of her deep interest in religious questions, and the courage and ability she displayed in upholding her own views. After studying at Sanbornton Academy, Mary was for some time under the tuition of Prof. Dyer H. Sanborn. This and the instruction of her brother Albert completes the story of her school days, but she never ceased to be a student. Mrs. Eddy's first husband was Col. George W. Glover, who took her to a home in the South where in a short time he died. She returned, a widow, to her father's house to meet with other trials. Her mother was in failing health and soon died, her father marrying again shortly after. Her own health, which had never been robust, was now much impaired, so that she was entirely dependent upon her friends. When they insisted on separating her little boy from her on the ground that his childish vigor and boisterous ways were too much for her delicate nerves, she was obliged to consent. In part through the influence of her sister she at length married an itinerant dentist, Dr. Daniel Patterson, a relative of the second Mrs. Baker. When about forty years of age, Mrs. Eddy, at that time Mrs. Patterson, became interested in the mental healing of disease. She had become a confirmed invalid, but even when confined to her bed she read, wrote, studied and spent long hours in thought. She had become convinced that the healing principle exercised by Jesus Christ still existed and might be made effectual if only it were understood. She had heard of cures wrought by Phineas P. Quimby, a magnetic healer of Portland, Maine, and came to the conclusion that he understood the law for which she was seeking. She went, therefore, to Dr. Quimby and through his treatments her health was restored, although her explanation of the cure—that it was the healer's knowledge and understanding of God's law—was not accepted by the healer himself. Mrs. Patterson continued her study of the Bible but did not feel that she had found the truth she sought until 1866. She was at this time living in Lynn, Massachusetts, and met with a fall which resulted in what the physician who was summoned diagnosed as a serious injury, giving her friends to understand that her death was to be expected. Mrs. Patterson, as one of her disciples states it "reached such a realization of the present healing potency of the Master's word that she was immediately made whole." Mrs. Patterson began shortly to teach her "discovery," as she called it, to pupils, giving it the name of Christian Science. In 1875 she published *Science and Health with Key to the Scriptures,* which has passed through many revisions and editions, and is still the textbook of the denomination.

Mrs. Patterson married Dr. Asa G. Eddy in 1877, having some years before secured a divorce from Dr. Patterson who had shamefully deserted her. From the time of her discovery in 1866 Mrs. Eddy's entire life was devoted to the study and development of Christian Science. She met with much opposition and for a long time found few followers. She had to contend with cherished opinions concerning religion and medicine, two subjects which lie very close to the heart of the average individual. Mrs. Eddy was engaged in teaching, lecturing, writing, and in directing the "Mother Church," established in 1879, until she reached the age of seventy. At this time she retired from active work in the church with the title of "Pastor Emeritus." For nearly twenty years she lived quietly at home, continuing with tireless energy to organize and direct the movement she had inaugurated. Mrs. Eddy has written much, has established periodicals, *The Christian Science Sentinel, The Christian Science Journal,* and the *Christian Science Monitor,* and has planned and put in operation the educational system of the denomination. Among her books may be mentioned, *Retrospection and Introspection, Unity of Good, No and Yes, Miscellaneous Writings,* and *Christian Science versus Pantheism.* Con-

flicting stories have been told concerning this woman's life, character and motives. That she was a remarkable woman none will deny, that she was honest, unselfish, and untiring in her devotion to a movement whose aim was purely beneficent is believed by those who knew her best, and that thousands think of her with warmest love and thanksgiving may be readily proven by anyone who cares to investigate. See CHRISTIAN SCIENCE; SCIENCE AND HEALTH.

It will be difficult to the layman in either the religious or medical worlds to properly estimate at its true value the life and career of Mary Baker Eddy. This much, however, the unprejudiced must admit: She was a woman with a mentality strong enough to hold her own against as bitter a tide of hostile criticism as ever threatened to overwhelm any leader of a new thought. In spite of this hostility Mrs. Eddy established, here in the United States, a cult which is today an important factor in the religious and social life of the nation. The Christian Science church is a recognized moral, religious, and medical force.

A woman who could in the short span of a generation—she did not found the church of which she was the leader until 1879—build so great an edifice upon so firm a foundation was more than an ordinary woman. She was a great woman. How great, the future alone can determine, for true greatness of a leader of a new thought can only be measured through the perspective of years. *San Francisco Examiner.*

Eddystone, ĕd′dĭ-stōn, a name given to three ridges of submerged rock off the coast of Cornwall, England. They are exceedingly dangerous to navigation, and have been the cause of shipwrecks innumerable. Many a gallant ship, returning home to England after a long and perilous voyage, has been dashed to pieces almost within sight of home. In 1700 Henry Winstanley, a public-spirited man, erected there a wooden lighthouse 100 feet high, with a stone base. Three years later builder and lighthouse were washed away. In 1709 a rich silk merchant erected a second lighthouse on much the same plan. It was burned down in 1755. In 1759 a third tower was completed, this time at the expense of the government. It had a diameter of twenty-seven feet at the base and fifteen feet at the top. It was seventy-two feet high. It was built of granite blocks weighing from one to two tons each. They were ingeniously dovetailed together. This lighthouse was undermined by the sea, and was replaced by a new tower in 1882. It has a total height of 133 feet. Its light, having a total strength of 160,000 candle power, is visible on a clear night for a distance of nearly eighteen miles.

Edelweis, ā′dĕl-vīs, a species of flowering plant closely related to the everlasting. The name is German, signifying "noble white." Its real flowers are yellow and inconspicuous, inclosed by woolly leaves of a pure white. The edelweis is the emblem of purity. It is found in the snowy ranges of Switzerland, and is so much sought by Alpine tourists that it is in danger of extermination by persons who bring it to the hotels for sale. Efforts, not without success, have been made to raise edelweis in America as a plant for rockeries.

Eden, in the Hebrew Scriptures, the first home of mankind. We are told in Genesis that "God planted a garden eastward in Eden," and that he placed man in the garden to care for it. The description of Eden and of its situation, however, is obscure. All attempts to identify it from this description with any existing locality have proved failures. This fact has been variously explained. Luther taught that Eden was protected from discovery by angels until the time of the deluge, when all traces of it were destroyed. Others explain the narrative as an allegory, claiming that Eden represents a state of innocence. The Hebrew word Eden means pleasure or delight, and is of frequent occurrence in literature to designate figuratively some especially delightful region. In *King Richard II,* Shakespeare speaks of England as "this other Eden."

They hand in hand, with wandering steps and slow,
Through Eden took their solitary way.
—Milton, *Paradise Lost.*

Summer isles of Eden lying in dark-purple spheres of sea.
—Tennyson, *Locksley Hall.*

Edfu, a town in upper Egypt. It is situated on the left bank of the Nile on

the twenty-fifth parallel of north latitude. The town is noted for a celebrated Egyptian temple, "the most perfect existing example of an ancient Egyptian religious edifice." In plan, architecture, and sculpture, it is an imitation of the work done by the Pharoahs, but it was founded by one of the Ptolemies, 222 B. C. The entrance is a massive double gate or pylon, 250 feet wide and 115 feet high. A large court with a peristyle of columns lies within. Beyond this is a hall, and beyond this a second hall, and beyond the second hall is a sanctuary—a mystery of mysteries. The total length of the temple is 450 feet.

Edgeworth, Maria (1767-1849), an English novelist. She was born at Hare Hatch, Berkshire. When she was twelve years old her father succeeded to the family estate of Edgeworthtown, Ireland, and removed his family thither. He educated his daughter himself. *Practical Education* and an *Essay on Irish Bulls* were joint productions of father and daughter. In 1800 Miss Edgeworth published *Castle Rackrent,* a novel of Irish life, which at once gave her a national reputation. *Moral Tales, Popular Tales,* and *Tales of Fashionable Life* followed. These are collections of short stories, and are probably her best work. Miss Edgeworth's novels include *Leonora, Patronage, Harrington, Ormond, Belinda,* and *Helen, a Tale.* Besides these she wrote a number of children's books: *Early Lessons, Rosamond, The Parents' Assistant, Frank, Harry and Lucy.* Miss Edgeworth's influence on literature was deep and lasting. Her style is easy and natural. She displays a keen sense of humor and excels in character drawing.

Three of her aims were to paint national manners, to enforce morality, and to teach fashionable society by satirizing the lives of the idle and worldly. . . . As a painter of national life and manners, and an illustrator of the homelier graces of human character, Miss Edgeworth is surpassed by Sir Walter Scott alone; while as a direct moral teacher, she has no peer among novelists. Among the many sweet memories her unsullied pages have bequeathed to the world, not the least precious is her own noble character, which ever responded to all that is best and most enduring in human nature.—Thomas Gilray.

Edict of Nantes. See HUGUENOTS.

Edinburgh, ĕd′in-bŭr-rō′, the capital city of Scotland. It is situated near the eastern shore, about two miles from the Firth of Forth. Leith is its principal port. The site is hilly. Seen from the sea, the city presents an imposing appearance, gaining for it the title of the Athens of the North. Like the chief city of the Athenians, Edinburgh grew up under the shelter of an acropolis. The scenic feature of the city is a sloping ridge of rock, shaped like a lady's leg-o'-mutton sleeve. The shoulder rises toward the west into a precipitous crag, and is accessible only from the east by way of the wrist and arm. Crowning the height sits the ancient citadel known to every Scot as the Castle.

Viewed from the castle height, a valley three hundred feet below runs east and west quite through the center of the town. It is admirably laid off in parks, gardens, and shrubbery, half concealing the railroads that in this way gain access to the heart of the city without destroying its beauty or rendering too painful the contrast between the ivy-clad historical past and the sooty, cinder-covered present. North of these gardens rises the New City, tier after tier, a splendid assembly of streets, palatial hotels, places of business, and elegant homes—all very attractive and well enough for the permanent resident; but the mind of the traveler returns to the castle.

Edinburgh was founded by the Northumbrian King Edwin, and was a favorite stronghold of the Stuarts. Sometimes it was a residence and sometimes it was the prison of a Scottish king. Although royalty left Edinburgh in 1603, when James VI of Scotland became James I of England, and though the Scottish Parliament was merged with the English Parliament a century later, the old rock is still regarded affectionately as the guardian of the liberties of Scotland. Although the wall that surrounds its summit would soon crumble beneath the fire of modern artillery, the castle has withstood many a siege, and, if guarded by a watchful garrison, was once considered impregnable. A garrison is still maintained. A huge cannon called Mons Meg, made at Mons in Belgium

1476, still guards the ramparts. It is constructed of iron bars carefully fitted together and bound with hoops. Its bore is twenty inches in diameter. A boy can swing himself into it with ease. Two of the old castle rooms are of especial interest,—Queen Mary's Room, where her son James, already mentioned, was born, and the Crown Room, where the regalia of the Stuarts, the ancient crown, sceptre, sword of state, and lord treasurer's rod were kept.

Save in Athens and Rome, it would be difficult to find a half hour's walk of greater interest than that down the long descent of High Street, leading from the Castle to Holyrood Palace at its eastern foot a mile away. This street was considered once the finest in Europe, though much of its glory has departed. The entire thoroughfare is known as High Street, but different parts as Castle Hill, Lawn market, where linen was sold, Netherbow, and Cannongate are known by special names. A branch called Westbow leads off to Grassmarket, whither the hangman's cart bore prisoners and criminals to be executed. A mere enumeration of the houses connected with notable persons would be tedious. For instance, tablets inform the curious that this was the house occupied by Hume, the historian; this the residence of John Knox; here Boswell entertained Samuel Johnson on their way to the Hebrides, etc.

One of the most notable buildings is St. Giles' Church, with a history dating from 1259. It is the Presbyterian or parish church of Edinburgh. John Knox preached here. The Solemn Pledge and Covenant was signed here. In his attempt to introduce Episcopacy and thus unify the churches of England and Scotland, Charles I made St. Giles' a cathedral; and it was here that Jenny Geddes, in righteous indignation, threw her cutty stool at the head of the dean who began to read from the new Episcopal service book. The lofty spire of St. Giles' overlooks the site of the ancient Tolbooth or the county gaol immortalized in Scott's *Heart of Midlothian.* The spot where the gaol once stood is marked by the large figure of a heart wrought in the stone pavement.

The old Parliament House is now devoted to the use of the supreme court. The great hall, with its oak carvings and statues of eminent men, is now a walk or lobby for lawyers in their wigs and black gowns. In this connection may be mentioned the Advocates' Library, the most extensive and valuable collection of books in Scotland. It is one of five libraries entitled by law to a copy of every book issued in the United Kingdom.

A description of all the buildings of note is out of the question, but visitors seldom fail to inspect and admire Holyrood Palace at the lower end of the street. It was originally an abbey. The main entrance is a magnificent stone portal richly carved. Queen Mary's apartments are shown still, and are said to be much as she left them. Her bedroom contains the ancient bed and other furnishings used by the hapless princess. The place at the head of the staircase where the assassins stabbed her favorite, Rizzio, is pointed out. A dark stain, possibly but not probably of blood, still marks the spot. Other buildings are those of the University, the Royal Infirmary, and Heriot's Hospital. The latter was founded by George Heriot, the Scotch goldsmith of James I, whose name is familiar to readers of the *Fortunes of Nigel.*

Edinburgh has never been a commercial or manufacturing city. To the last statement, one exception must be made. Edinburgh has been noted as a center of the publishing trade. An English translation of the Bible was published here as early as 1576. *The Edinburgh Review* and *Blackwood's Magazine, Chambers's Encyclopedia, The Encyclopedia Britannica,* the *Waverley Novels,* and many other notable publications have come from the Edinburgh press.

The population of the city in 1911 was 320,318. In 1921 it was 420,281. The city is growing. It depends for prosperity on the courts of law, the university with 3,000 students, and various colleges, as well as its desirability as a place of residence. The climate is delightful, and favorable to longevity. The average temperature for January is 36.6°; that for

July is 58.3°. The annual rainfall is twenty-six inches. The city recently expended $56,000,000 in building reservoirs and securing a supply of water from the head waters of the Tweed.

Sir Walter Scott is the writer who has described Edinburgh as Dickens has described London. His birthplace is pointed out. A Gothic canopy in the New Town on Princes Street overlooking the gardens shelters a statue of the great romancer. Its topmost pinnacle is 200 feet high. The available niches are occupied by figures of Scott's characters. Meg Merrilies, Redgauntlet, Rob Roy, Wamba, and three score others are all there. It is one of the most remarkable monuments ever erected to the memory of a literary man—a fitting tribute from the city by him so often and so well described.

Edinburgh is known by many names, as Modern Athens, the City of Homes, Dunedin, and the Capital of the North. "A city of incomparable loveliness," says Oliver Wendell Holmes, but, to the genuine Scot at home or abroad, the best name of all is just Auld Reekie—Old Smoky.

See SCOTLAND; SCOTT.

Edison, Thomas Alva, a noted American inventor. He was born at Milan, Ohio, February 11, 1847. Financial circumstances prevented his going to school. At the age of twelve he was a newsboy on the Grand Trunk Railway. He was "fond of reading." The printing press and the telegraph instrument had a fascination for him. In 1862 he bought a small hand press, set it up in an abandoned freight car, and published a small weekly paper which he called *The Grand Trunk Herald.* Later he became a telegraph operator at Mount Clemens. He was noted for rapidity and accuracy. It is said, however, that fondness for playing practical jokes cost him several positions.

In 1864 he invented what is known as the automatic telegraph repeater. This was the first of a long list of electrical inventions. He invented, also, a machine for indicating the price of stock, known as a commercial stock indicator. This he sold to a New York company for $40,000. With this money he set up a laboratory and workshop at Newark, New Jersey. In 1876 he removed to Menlo Park, from which he is called often "The Wizard of Menlo Park." Later he established himself at West Orange, New Jersey. The manufacturing end of his establishment gives employment to several hundred men. He keeps a large force of experts busy at work making experiments under his direction. Among Edison's more noted inventions are the phonograph, a long distance telephone, the megaphone, the incandescent electric lamp, and a storage battery for cars and automobiles.

Honors have been heaped upon Edison by foreign governments. In 1878 he was made chevalier of the French Legion of Honor. He has been honored also by Italy and by the Society of Arts of Great Britain. He is a man of undoubted intellectuality and of equal industry. He has said himself that "genius is two per cent inspiration and ninety-eight per cent perspiration." He reads omnivorously. Each day's mail brings him new books from all parts of the world. His method of procedure is to determine first of all that a certain article or device is desirable. He then sets himself and his men at work to invent it. He is a man without time for gossip and none for rest. Frequently he telephones for his meals to be sent to his workroom. The carriage which now calls for him is obliged frequently to wait for hours until he has come to a stopping place. Fortunately, he passed the point long since where money is a consideration. It is impossible to get his ear on money matters. The talking pictures that first appeared in 1913 were produced by Edison by synchronizing the motion picture and the phonograph. He received the Nobel prize for physics in 1915, and in that year was chosen president of the Naval Consulting Board of the United States. After America's entrance into the World War, Edison was placed in charge of several large plants for the manufacture of chemicals. One of his latest inventions is a powerful portable searchlight, fed by a storage battery, for use in mine rescue work or other work where smoke is encountered.

Edmonton, Canada, an important industrial and commercial city, is the capital of the province of Alberta. Established as a fur trading post in 1795, Edmonton remained but little more than a village until as late as 1901; but the growth thenceforward was exceedingly rapid. It is situated on the North Saskatchewan River, by the shortest route 793 miles northwest of Winnipeg, and 194 north of Calgary.

The river is navigable from Edmonton to its mouth in Lake Winnipeg, about 850 miles, and this situation on a river that is an artery of commerce has been an important factor in the city's development. Of greater importance in this connection are the railroads. A branch of the Canadian Pacific Railroad was extended northward to Edmonton in 1891; the Canadian Northern reached the city in 1905, and the Grand Trunk Pacific five years later. Since that time two others have been added —the Alberta & Great Waterways and the Edmonton, Dunvegan & British Columbia.

Industry and Commerce. The valley in which Edmonton is situated is rich in agricultural lands and coal fields and the surrounding country produces an abundance of lumber. The city is also the commercial center for the Peace River Valley, and is one of the greatest fur markets in the world. Within the city limits are nine coal mines, and twenty-four others lie just outside. Deposits of gold, silver and petroleum, all in workable quantity, are also found in the vicinity. Flour milling and meat packing are important industries, and there are foundries, machine shops and lumber mills. Live stock, dairy produce and farming and mining machinery are important articles of Edmonton's extensive commerce.

Buildings and Schools. Of the public buildings in Edmonton, the Parliament Building is the most conspicuous, while the court house, the civic block, Government House, the Chateau Macdonald and McLeod Building are noteworthy.

Edmonton is the educational center of the province, and has, besides forty-five modern public schools—including the Victoria High School and the John A. McDougall School—the University of Alberta, Alberta College, a branch of the Normal School, a Presbyterian College, Westminster Ladies' College, the Edmonton Technical School, Robertson College and two business colleges. It has also a fine public library.

During the gold-seeking days of 1897 and the years immediately after, Edmonton was an important outfitting station and point of departure for the Yukon and Alaska; but this prosperous city of 58,821 inhabitants in 1921 is of even greater importance now. The municipality owns and controls the electric light and the water plants, and the telephone and street railway systems.

Edmund II (989-1016), king of the West Saxons. He was surnamed Ironsides. He succeeded his father Ethelred "the Unready," in April, 1016. Canute the Dane forced Edmund to divide his kingdom. Canute took the northern part —the York end, and Edmund retained the southern or London end. At Edmund's death Canute assumed the control of the whole kingdom.

Edmunds, George Franklin, (1828-1918), an American statesman. He was born in Richmond, Vermont, became a lawyer in 1849, sat in the lower house of the state legislature from 1854 to 1859, and in the state senate from 1861 to 1862. Four years later he went to Washington as a senator from Vermont, a position to which he was successively re-elected until 1891. After Mr. Arthur became president, Mr. Edmunds acted as president *pro tem* of the senate. He served on many important committees, championed the bill of 1882 suppressing polygamy in Utah, helped to prosecute President Johnson, and was otherwise active in public affairs until 1891, when he retired to resume his practice as a constitutional lawyer. In 1880 and again in 1884 he was a candidate for the presidential nomination on the Republican ticket.

Education, from the Latin, *educare,* meaning *to lead forth,* the development of all the powers of the individual. School systems of all enlightened countries recognize this meaning of education and provide

for the development of all the powers of the pupils — physical, intellectual and moral. In addition to the supervisors, regular teachers and special teachers, the physician, dentist and oculist are called upon to aid in removing hindrances to the child's progress by remedying physical defects, such as defective vision, deafness, adenoids, inflamed tonsils and general debility due to lack of nourishment. In school systems of large cities in America this professional aid is constantly required and provided for in the school budget. Recent modifications in courses of study and in methods of instruction emphasize the development of all the child's powers. The practical trend of instruction leads the pupil to prepare himself for his vocation. Vocational guidance is an important factor of the city school system and is very helpful in assisting the pupils to decide upon the occupation or profession they desire to follow.

Vocational training is the outgrowth of manual training, which was introduced into schools the latter half of the 19th century. This was soon followed by instruction in domestic science, so that girls had the same advantage in preparing for an occupation as boys. Evening schools, open to all regardless of age, and continuation schools which enable pupils to do a part of their work in school and the remainder in the factory, store of office, as the case may be, now form a part of the system of many large cities. In the United States education is provided for everyone.

There is no national system of education in the United States. The duty of educating its youth is left to each state so that technically there are in the country forty-eight school systems. However, these are so nearly alike in every respect that they blend into one great system. This uniformity is the outgrowth of frequent conferences of educational leaders such as state superintendents of public instruction, superintendents of large cities and heads of leading colleges and universities. Plans laid at these conferences have been so carefully worked out that in every state there is now a complete graded system of public schools leading from the kindergarten to the university. This system provides for a sufficient number of high schools to enable all who desire education beyond the grades to obtain at least a high school education without any expense for tuition. For detailed plans of public education see the sub-title *Education* in the articles on the respective states.

Higher Education. In 1923 there were over five hundred colleges and universities in the United States. These were under state, municipal or denominational control. Most of the larger universities, including the state universities, maintain professional schools such as colleges of law, medicine and dentistry. Agricultural colleges, through their system of extension work ,reach the farmers in their respective states, and many of the larger universities maintain an extension division which furnishes instruction through correspondence and lecture courses in all centers where there is sufficient interest to maintain such courses.

Canada. Public education in Canada is entirely under the control of the provinces. Each province has a Department of Education with a Minister of Education at the head. There is no Dominion Department of Education corresponding to the United States Bureau of Education. Some provinces have two systems of schools—the non-denominational in Protestant communities, and the Roman Catholic schools in French and Irish communities in which the religious teachings of the church are allowed. This dual system has been the cause of occasional political agitation in a number of provinces.

The support of the system in all provinces is derived from a provincial appropriation and local taxation, the latter constituting the chief source of revenue. For a description of the educational system in each province, see the article on that province, sub-title, *Education,* in these volumes.

Education, United States Bureau of. A bureau in the Department of the Interior, established in 1868 to gather and disseminate education in the United States. The chief officer is styled Commissioner of Education and is appointed by the Pres-

ident on the advice and consent of the Senate. Since its organization the scope of the bureau has been greatly enlarged It is now organized into a number of divisions, among the most important of which are the divisions of school sanitation and hygiene, of higher education, of rural education, of school administration and the editorial library division. The best specialists in various lines of educational work are connected with the bureau and they are engaged through lecturing, making surveys and preparing literature, in following the interests of education throughout the country. In addition to this, much information bearing upon educational methods in the United States and other countries is gathered and distributed. The commissioner issues an annual report and the bureau issues a large number of circulars and bulletins, any of which maye be obtained by writing for them.

The bureau is sustained by appropriations from Congress. Unfortunately these are never adequate to meet the demands placed upon it. Numerous attempts have been made to raise the bureau to the rank of an executive department on par with the Department of the Interior, Agriculture, etc. Should this be done the Commissioner of Education would be given the rank of secretary and become a member of the President's cabinet.

Edward I (1239-1307), surnamed "Longshanks," king of England. He reigned 1272-1307. He was born at Westminster and died near Carlyle. He was the son of Henry III and Eleanor of Provence. He married Eleanor of Castile. While a young man, Edward assisted his father in curbing the power of the barons, overthrowing their leader, Simon de Montfort, at Evesham in 1265. At the request of the pope Edward took a prominent part in the Seventh Crusade. He captured Nazareth from the Turks, and massacred the inhabitants. In revenge for this cruelty, it is thought, an assassin stabbed him in three places with a poisoned arrow. Owing to a magnificent constitution he came through with his life. A story runs to the effect that Eleanor saved him by sucking out the poison with her lips.

On hearing of the death of his father Edward returned home to be crowned. He was an active, arbitrary ruler. He accomplished the conquest of Wales. He took measures to expel the Jews from England. He interfered in the affairs of Scotland, placed Baliol on the throne and again deposed him, carrying the ancient coronation stone of Scotland to Westminster, where it yet remains. He executed Sir William Wallace and died on his way to Scotland to suppress Bruce.

Though the name of Edward I is not a source of pleasure to the Welsh and to the Scotch, he was a royal English monarch—a very prince of men to his own people. His soldiers heard him urge clemency for the followers of Montfort. They saw him weep in bitter grief for the death of his father, though it placed him on the throne of England. He lay with his soldiers on the ground and suffered both hunger and thirst in the mountains of Wales and on the Scottish border. Under all circumstances he was an Englishman and a soldier, a hard master, but a loyal, single-minded prince—one who loved his people and was loved by them. Edward was "unselfish, laborious, conscientious, haughtily observant of truth and self-respect, temperate, reverent of duty and religious. For the most part," continues Green, the historian, "his impulses were generous, trustful, averse from cruelty, prone to forgiveness." "No man ever asked mercy of me," said he in his old age, "and was refused." Those who read the fate of Wallace, sent to a felon's death by Edward, need to know that this haughty king is the same English Edward who loved his Eleanor while living, and ceased not to love her when dead; and that this is the same Edward who reared a cross at Charing, and wherever else the bier of Eleanor rested on the way to the grave.

Edward deserves well at the hand of the historian. He reorganized the courts of England in the interest of speedy and impartial justice. He equalized the burden of taxation and of military service. He was the first English monarch to summon merchants and burghers to sit in Parliament. In person he was a tall, deep-chest-

ed, long-limbed man. The people called him Longshanks. He instituted legal reforms; the jurists call him the "English Justinian." Soldier, lover, and lawgiver, Edward was the greatest of the Plantagenets.

Edward II (1284-1327), king of England. He was the son of Edward I and Eleanor of Castile. He was born at Caernarvon Castle, Wales, and in 1301 was given the title "Prince of Wales," then extinct by the death in battle of the last Welsh prince. He was the first of the English princes to bear this name. Edward II resembled the pleasure-loving Stuarts more than he did his martial father. He was governed by an insolent and unworthy favorite, Piers Gaveston, whom, indeed, Edward's barons executed. This is the "Proud Edward" who in 1314, invaded Scotland at the head of a large force and was defeated ignominiously by Robert Bruce at Bannockburn. Edward was unfortunate in family affairs. Queen Isabella, sent on a mission to France, entered into a traitorous, not to say criminal, intrigue with Roger Mortimer, a disaffected young baron, and returned to England at the head of an armed force. The conspirators seized the Tower of London and took Edward prisoner. A Parliament, completely under their influence, deposed Edward and placed his son, a mere boy, on the throne. A few months later, Edward was sent from the Tower to Kenilworth Castle and later to Berkeley Castle, where he was assassinated by two ruffians in the pay of Mortimer.

Edward III (1312-1377), king of England. He was born at Windsor and died at Richmond. As stated, he was placed on his father's throne in 1327, at the age of fifteen. During his minority the kingdom was ruled ostensibly by a regency of twelve lords. In reality authority was usurped by the guilty Isabella and her partner, Mortimer. In 1330 Edward III, now eighteen years of age, took matters into his own hands. He broke into the strong castle of Nottingham, where Isabella and Mortimer were, and dragged Mortimer to the Tower. Mortimer was brought before the Parliament and charged with the murder of Edward II. He was found guilty and was hanged on an elm at Tyburn. Edward could not be expected to take severe measures against his mother. She was sent into retirement, in reality into hopeless captivity, where she was visited once a year by her son, the king.

Edward's reign was noted for wars. He engaged in a desperate attempt to subjugate Scotland. He set up a claim to the French throne. He added "King of France" to his title, a practice maintained by British sovereigns until 1802. Edward thus entered upon a long series of conflicts with France, known as the "Hundred Years' War." No little success followed the banner of England; yet, before the close of Edward's reign, nearly all the conquered territory was lost again.

During this reign great changes came to the common people. The Black Death, the greatest plague that ever visited the country, swept away half of the peasants. Laborers were scarce, wages rose. A system of practical serfdom came to an end. It was impossible in some sections to get help to gather the harvest. At the entreaty of landowners Parliament passed an act, called the Statute of Laborers, which reëstablished the old prices of labor, and compelled laboring men to seek employment within their own parishes. This led in the next reign to what is known as the Peasants' Rising of 1381.

Ever since the Norman Conquest Latin had been the language of business and official correspondence. French was the language of society and of light literature. The peasantry held to the old Anglo-Saxon or English language. During Edward's reign this language began to crowd Latin and French to the wall. The writings of Wyclif gave a powerful impulse to the rise of English. Toward the close of Edward's reign the English language replaced the French language in the schools. In 1357 a statute was passed requiring the use of English in courts of justice.

A very great change took place also in the form and powers of Parliament. It became divided into two houses with enlarged powers. The war with France was expen-

sive. It was necessary to ask Parliament for large grants of money. The House of Commons established the principle that redress of grievances must precede a grant of supplies. The Good Parliament, established in 1376, impeached Edward's ministers, establishing much the same method of procedure now followed in English-speaking countries.

See BALIOL; CRECY; BLACK PRINCE; BLACK DEATH; IMPEACHMENT.

Edward IV (1441-1483), king of England. He was born at Rouen, France Edward IV ascended the throne in 1461. His accession and the earlier events of his reign are but episodes in the famous Wars of the Roses. Edward was the second son of Richard, Duke of York. By the death of his father, at the battle of Wakefield in 1460, Edward became the head of the Yorkists. On hearing of his father's death he gathered together a combined army of Welsh and English and won a victory over the Lancastrians at Mortimer's Cross. A few days later the Lancastrians were victorious at St. Albans, but, while they lingered here plundering, Edward set out for London on horseback. He was a handsome, popular prince. The Yorkists hailed him with acclaim and, in the absence of the Lancastrian king, Henry VI, proclaimed him sovereign.

The story of the struggle between the Yorkists and Lancastrians is unprofitable reading. Warwick, the king-maker, had no sooner placed Edward on the throne, than he became offended because the king concluded a marriage with Elizabeth Grey, instead of espousing the sister of Louis XI of France. Warwick fomented an insurrection and fled to France; yet returned, drove Edward into exile in Holland, and replaced the last Lancastrian Henry on the throne. To cut these wearisome details short, Edward returned, defeated the forces of Henry and Warwick, the latter falling in battle at Barnet, April 14, 1471. A few weeks later Edward defeated the forces of Queen Margaret at Tewkesbury. Henry died in the Tower, and Edward's reign was secure.

During Edward's reign popular government went backward. A favorite invention of his was a system of "benevolences." This was a gift of money which he requested from rich subjects, and which they were afraid to refuse. This system of benevolences rendered the king in a measure independent of Parliament. The power of that body was correspondingly diminished.

See WARWICK; WARS OF THE ROSES.

Edward V (1470-1483), king of England. He was born at Westminster Abbey. He was the heir of Edward IV, but Edward V was little more than twelve years old at the time of his father's death. His uncle, Richard, Duke of Gloucester, the same who is known in history as Richard III, appointed himself guardian of the young king. A servile Parliament proclaimed him Protector of the Realm. The wicked duke secured the execution of such noblemen as stood in his way. He then called a meeting of Parliament, and secured the passage of an act declaring the marriage of Edward IV to the mother of the young king illegal. Richard then sent Edward V and his younger brother to the Tower, where they were murdered. Brackenbury, the constable of the Tower, refused to obey Richard when ordered to put the two princes to death; but Sir James Tyrrel, an infamous noble, armed with a warrant ordering the constable to give him the keys, admitted two assassins, who smothered the princes under pillows while they were asleep. Shakespeare has made much of the murder in his play, *Richard III.*

Edward VI (1537-1553), king of England. He was born at Hampton Court and died at Greenwich. This prince was the son of Henry VIII and his third queen, Jane Seymour. He succeeded to the throne in 1547. His reign was but nominal. The affairs of the kingdom were managed by a regency under the Duke of Somerset and later the Duke of Northumberland. Edward was betrothed to Mary, Queen of Scots, but Mary was spirited off to France by Scottish noblemen who rendered the marriage impossible. The Book of Common Prayer was prepared, chiefly by Archbishop Cranmer, during this reign. Edward died of consumption.

He was constrained by certain noblemen to leave a will bequeathing the crown to Lady Jane Grey, but he was succeeded by his half sister, Mary, whose title to the throne was unquestionable.

Edward VII (1841-1910), king of Great Britain and Ireland. He was also styled Emperor of India. He was the first son, the second child, of Queen Victoria and the Prince Consort, Albert of Saxe-Coburg. He was born at Buckingham Palace, November 9, 1841. At the age of fourteen he was made Prince of Wales. His education was supervised by competent private instructors. He also took lectures at Oxford, Cambridge, and Edinburgh. He traveled extensively. In 1860 he visited Canada and the United States. In 1862 he visited Egypt, Palestine, and Athens. His traveling companion was Arthur Stanley, later Dean of Westminster Abbey. In 1875 he visited India, and in 1885 paid a visit to Ireland. He came to the throne at the death of his mother, January 22, 1901. Formal coronation services were held in Westminster Abbey, August 9, 1902. March 10, 1863, he was married to Alexandra, the eldest daughter of the king of Denmark. The king and queen had five children, two sons and three daughters. Albert, the eldest, died in 1892. George, the second son, now on the throne, was born June 3, 1865. Louise was born in 1867—she is the wife of the Duke of Fife; Victoria Alexandra, in 1868; and Maud Charlotte, in 1869, now wife of Haakon VII, king of Norway.

Owing to the long reign of his honored mother, Edward came to the throne late in life. At date of his formal coronation he was over sixty years of age. In his youth he was a prime favorite with sporting and society people. He was fond of yacht racing, cricket, athletics, and shooting. His colts won three Derbys. He was fond of cards and played for high stakes. He spent money liberally, far outrunning a princely allowance. Owing to royal etiquette, which forbids the heir from showing an interest in public affairs, Edward gave little promise of statesmanship. On his accession to the throne, however, the king pleased his friends by an assumption of quiet dignity, a patriotic regard for the welfare of his subjects, and prudence in the discharge of his duties. Edward was a bluff, democratic king, peaceable in disposition. He exerted a stronger influence over Parliament and his ministry than did his royal mother. He assumed at once a leading place among the crowned heads of Europe, as befitted the head of the most powerful nation in the world. In diplomatic circles he exerted an influence in favor of fair play and of good feeling, winning the name of Edward the Peacemaker.

In personal appearance the king was a typical Englishman, rather below the average stature, of strong and heavy build. His face was ruddy and betokened good health and good spirits. He wore his gray beard trimmed to a sharp point. A thin circle of gray hair diminished until he was quite bald. Even in his latter days he continued to be one of the best dressed men in Europe, and was regarded as a model for refinement of dress and bearing.

At state functions King Edward revived all the pomp and circumstance of medieval days. He drove to Westminster at the opening of Parliament in a sumptuous royal coach, attended by heralds, equerries, and outriders and a vast retinue, forming a pageant of royal splendor. On these occasions he wore the full robes of majesty.

Tactfulness was a conspicuous characteristic. The late king was frank, loyal, and warmhearted always. Those who associated with him said he was emphatically a "good fellow," simple and courteous, but a stickler for the deference which his rank demanded.

King Edward's death was regretted universally. It came at a crisis in a long contest between the Commons and the House of Lords. The Liberals were urging him to notify the Lords that unless they were willing not to obstruct the will of the people as expressed by the popular house, the hereditary house would be invaded by a sufficient number of newly created peers to effect desired legislation. King Edward was succeeded by his oldest living son who reigns under the title of George V.

See BUCKINGHAM PALACE; WINDSOR; BALMORAL; VICTORIA; BRITISH EMPIRE; PRINCE OF WALES.

Edward the Confessor (1004-1066), king of the West Saxons. He was the son of Ethelred II and Emma of Normandy. During the days of Danish supremacy he lived in Normandy. On the death of Hardicanute he returned to England at the invitation of Godwine, whose daughter, Edith, he married. In 1042 the Witan, a national assembly of lords and ecclesiastics, placed him on the throne. Edward came of royal lineage, but was not the direct heir. Edward was a man of excellent personal qualities, but he lacked force and decisiveness. During his reign the Normans acquired great influence at court. William the Norman, who afterward conquered England, even went so far as to claim that Edward left him the kingdom of England in his will. Edward died without children; he was succeeded by his wife's brother, Harold, the same who was overthrown by William. Edward caused a notable compilation of laws to be made. This code is known as "The Laws of Edward the Confessor." He died in the odor of sanctity, and was canonized by Pope Alexander III in 1161.

Edward the Elder (870-925), king of England. He succeeded his father, Alfred the Great, in 901. Edward continued the work of unifying the kingdom, which had been carried on so well by his distinguished father. He annexed Mercia. He repelled the attacks of foreign Danes. He erected strong fortifications on the Welsh and Northumbrian frontiers.

Edwards, Jonathan (1703-1758), a celebrated New England divine and theologian. He was born in Windsor, Connecticut, and died at Princeton, New Jersey. He graduated at Yale in 1717. After a short term as a tutor in that institution he became pastor at Northampton, where he remained twenty-three years, participating in revival work. In 1750 he was dismissed by the Northampton church and became a missionary among the Massachusetts Indians. In 1758 he was elected president of Princeton College, and, as stated, died the same year. Edwards had a powerful intellect. He was an impressive preacher, somber and even gloomy in his religious opinions and sentiments, but earnest, unaffected, and nobly conscientious. Of many theological works his *Freedom of the Will* and *Original Sin* are most noted. Edwards' life and work were so colored by a somber theology that posterity has not done credit to one of the sweetest spirits of the age. Believing, as he did, that his fellowmen were tottering on the brink of the bottomless pit, no trivial matters were worthy of the attention of an immortal soul; and yet we find in him distinct traces of the future Emerson and his school of calm thinkers. "True religion," said he, "in a great measure consists in holy affections. A love of divine things for the beauty and sweetness of their moral excellency is the spring of all holy affection." See DWIGHT; BURR.

Eel, a family of serpent-shaped fish. They are long and slender with soft, slimy skins. The body is round or else ribbon-shaped. The scales are imbedded so deep that they cannot be seen or felt till the skin is dried. The gill openings are small, and close so tightly that eels can live out of water for some time. Some species even leave the water and glide over meadows at night in search of food. They are found in warm and temperate climates. Some species inhabit salt, others fresh water, and others again migrate. Fresh water eels lie dormant in muddy bottoms during the winter. Aristotle thought they sprang from mud. A popular idea in England at one time was that the hair of a stallion's tail, left in water, would turn into eels. It is now known that they breed by means of eggs or ova like other fishes. A nest of pebbles in running water is preferred. A colony of eels in the Saco River, Maine, formed a heap of stones fifteen feet long and three feet high, in which to deposit eggs. The eel grasps a stone, sucker fashion, and drags it along the bottom till it is in place.

The conger eel of European waters attains a length of three to ten feet and a weight of five to one hundred pounds. It preys on other fish. The sharp-nosed eel of Europe swarms in the rivers of Great Britain, and is a staple article in the fish markets. The greenish olive eel of this country is abundant in streams from Maine to the Mississippi and Brazil. It is taken

with spears by torchlight, and in eel-pots. The latter is a willow-basket contrivance to which Washington Irving refers in describing the schoolhouse of Sleepy Hollow, so constructed that eels can enter but not get out again.

An electric eel called the gymnotus, found in the swamps of South America appears to be charged with electricity capable of giving a man a severe shock.

It being very difficult to catch the gymnoti with nets, on account of their extreme agility, it was resolved to procure some by intoxicating or benumbing them with the roots of certain plants, which when thrown into the water produce that effect. At this juncture the Indians informed them that they would fish with horses, and soon brought from the savanna about thirty of these animals, which they drove into the pool.

The extraordinary noise caused by the horses' hoofs makes the fishes issue from the mud and excites them to combat. These yellowish and livid eels, resembling large aquatic snakes, swim at the surface of the water, and crowd under the bellies of the horses and mules. The struggle between animals of so different an organization affords a very interesting sight. The Indians, furnished with harpoons and long slender reeds, closely surround the pool. Some of them climb the trees, whose branches stretch horizontally over the water. By their wild cries and their long reeds they prevent the horses from coming to the edge of the basin. The eels, stunned by the noise, defend themselves by repeated discharges of their electrical batteries, and for a long time seem likely to obtain the victory. Several horses sink under the violence of the invisible blows which they receive in the organs most essential to life, and, benumbed by the force and frequency of the shocks, disappear beneath the surface. Others, panting, with erect mane, and haggard eyes expressive of anguish, raise themselves and endeavour to escape from the storm which overtakes them, but are driven back by the Indians. A few, however, succeed in eluding the active vigilance of the fishers; they gain the shore, stumble at every step, and stretch themselves out on the sand, exhausted with fatigue, and having their limbs benumbed by the electric shocks of the gymnoti.

In less than five minutes two horses were killed. The eel, which is five feet long, presses itself against the belly of the horse, and makes a discharge along the whole extent of its electric organ. It attacks at once the heart, the viscera, and the caeliac plexus of the abdominal nerves. It is natural that the effect which a horse experiences should be more powerful than that produced by the same fish on man, when he touches it only by one of the extremities. The horses are probably not killed, but only stunned; they are drowned from the impossibility of rising amid the prolonged struggle between the other horses and eels.—**Alexander von Humboldt.**

Efficiency. See MACHINE.

Egede, Hans, ā′gĕ-dĕ (1686-1758), a Danish missionary, termed the Apostle of Greenland. He was born in Senjen, Norway, and died in the Island of Falster, Denmark. He was educated for the Lutheran ministry, but obtained a commission from the Danish government to convert the Eskimos of Greenland to Christianity. With this purpose he and his two boys took up their residence among the tribes on the coast of Greenland and accompanied them in their hunting expeditions. He resided among the Eskimos fifteen years, studying the language, healing the sick, and relieving the miseries of the natives in a thousand ways. He made long trips to reach the isolated villages, and, though discouraged by the small number of actual converts, he won the confidence of the natives to an extent not previously attained. Trading ships visiting the coast in the summer time kept Egede in communication with the world. He received packages of books and papers, clothing and medicines, and sent his sons home for a time to be educated. In 1736 he left the mission work to his son Paul and returned to Denmark. Paul remained among the Eskimos until 1740, when he, too, returned to Denmark, where he received the title of "Bishop of Greenland." Father and son worked together in the preparation of an Eskimo dictionary and grammar, and in the translation of the Gospels into the Eskimo language. They wrote several volumes of experiences, valuable for their contribution to natural history and a knowledge of the Greenland Eskimo.

Eggleston, ĕg′lz-ton, **Edward** (1837-1902), an American novelist. He was born at Vevay, Indiana, and entered the Methodist ministry at nineteen. He spent 10 years in Minnesota preaching and tramping for his health—even at one time selling toilet articles from a peddler's pack. Later he attracted attention by magazine articles and became editor of the *Little Corporal* and of the *Independent,* as well as a contributor to *Scribner's Monthly.* In 1871 *The Hoosier Schoolmaster,* his first novel, appeared. This was the first of a series of stories dealing with the Middle

West. *The End of the World, The Mystery of Metropolisville, The Circuit Rider, Roxy,* and *The Graysons: A Story of Illinois,* have found many readers. Some writings of a historical nature, particularly his *Beginners of a Nation,* show that Eggleston might have succeeded in this field; but his reputation rests on *The Hoosier Schoolmaster.* This novel occupies a place of its own in American literature in that it is the first of its kind. One cannot see that the style and plot of this novel have grown out of any story Eggleston can have read. It appears to be the beginning of a new kind of novel writing, of which *David Harum* and *Eben Holden* are examples.

Eggleston, George Cary (1839-1911), a journalist and author, was born in Vevay, Indiana. He was editor at different periods of several New York newspapers, among them the *World,* the *Evening Post,* and the *Commercial Advertiser.* He wrote a number of books, among them, *A Man of Honor; A Rebel's Recollection; The Wreck of the Red Bird; Red Eagle; Juggernaut* (with Dolores Marbourg); and two books for young people: *How to Educate Yourself* and *How to Make a Living.*

Eggplant, a tropical plant sometimes called Guinea squash. It is thought to be a native of the East Indies. It is a relative of the tomato, ground cherry, and nightshade. The plant is raised in much the same manner as the tomato. It requires deep, rich, dry, mellow soil. It grows best in the Southern States but is raised successfully as far north as New York. Early fruit is secured by forcing in hothouses. The fruit of the European varieties is pale or white. American gardeners prefer black or purple fruit. The eggplant is subject to various blights and insects that render its cultivation more difficult than that of the tomato. When properly crated the fruit bears shipment better than the tomato.

Eggs, the containers of the germ of reproduction of all birds and of many reptiles, of fishes, molluscs and insects. The egg having the greatest value to man is that of the domestic hen; the eggs of ducks, geese and other domestic fowl are next in importance. The food value, and therefore the commercial value, of eggs is very high.

A bird's egg consists of five parts. The outer layer, the shell, which comprises some eleven per cent of the egg's total weight, is composed largely of carbonate of lime. The next layer is a thin but tough double membrane which separates at one end of the shell and forms an air chamber between its two parts. Inside of the membrane is the "white." This is albumen, containing a large amount of water. Through the albumen run two threads, the function of which is to keep the yolk in place. The yolk of the egg, the large yellow ball that lies in the center of the albuminous mass, is a large single cell contained in a very thin, transparent membrane. This yellow mass is the food upon which the young bird subsists before emerging from the egg. Finally, near the surface and on one side of the yolk is the vesicle or germ, appearing as a thin white disc.

Eggs as Food. The food value of eggs was recognized by the ancients, and the eggs of fishes, reptiles and birds are still staple food wherever man makes his home. The egg of the domestic fowl, however, is used more widely and esteemed more highly than in any other kind of egg.

Freed from its shell, the egg contains 73.7 per cent of water, 14.8 per cent of protein, 10.5 per cent of fat and approximately one per cent of ash. The fuel value of eggs is about 720 calories to a pound. Comparatively to their bulks, the yolk of an egg is more nutritious than the white, the former containing 16.1 per cent of protein and 33.2 per cent of fat, while the latter has 13 per cent of protein and only 0.2 per cent of fat.

Testing for Freshness. The two general methods of determining the comparative freshness of eggs are "candling" and "brine testing." Candling consists in holding the egg, in a device, usually of cardboard, that shuts off all light from the sides, against a fairly strong light. If the egg is fresh it will show clear—without a spot; if it is addled the egg will show clouded; and if the germ has begun to de-

velop, that is, if incubation has begun, a well defined dark spot will show. Only when the egg shows clear is it fit for use.

The brine used in the other method is made by dissolving salt in water in the proportion of two ounces to one pint. Dropped into a vessel of this solution, a fresh egg sinks straight to the bottom. The older an egg is the more it has evaporated; the density of the egg is, therefore, light in proportion to its age, and the egg will not go to the bottom. An egg that is more than three days old will float on top of the brine.

The production of eggs varies considerably throughout the year and from one year to another; for this reason it is difficult to compile exact commercial data for this commodity. The United States is the largest producer and user of eggs in the world.

See CHICKEN; POULTRY.

Eginhard, ā′gin-hart, or Einhard (771-840), a German historian chiefly remembered for his *Life of Charlemagne.* He was born in what is now Hesse-Darmstadt. Alcuin, Charlemagne's friend, was his teacher. As a young man he gained the confidence of Charlemagne and was made his secretary, going with him on all his journeys and expeditions of conquest. Small wonder that his biography of the great king bubbles over with pithy incidents! Besides its interest as a narrative the book is perhaps the most valuable historically of the biographies that have come down from the Middle ages. He wrote also *Annals of the French King,* and a book of *Letters,* both of great historical interest. After Charlemagne's death Eginhard transferred his services to Louis le Dèbonnaire. See ALCUIN; CHARLEMAGNE.

Egmont, Count (1522-1568), a Dutch statesman and soldier. Egmont's life belongs to the stormy period of the Reformation. He won high reputation as a soldier and commander under the banner of Charles V.

Egret, a name given to a species of white heron, having the feathers of the lower part of the back elongated and the webs disunited. The habitat of the egret is Europe, the United States and India, where it abounds. The forms of egrets are very graceful, excelling those of the common heron. The American egret is about 37 inches long to the end of the tail, plumage soft and blended; the European is about 40 inches long, with a pure white plumage; the small European egret is about 22 inches long, also with white plumage. The beautiful plumage is eagerly sought for millinery purposes. The feathers used (aigrettes) are those which grow between the shoulder blades of the birds, and in the nesting season only. It has been the cruel practice to kill the adult birds for their feathers, and leave the helpless young to starve. Various countries have now adopted protective legislation, making it illegal to kill these birds. In India the egret is bred in captivity, and when the young are a week old they are taken away from the nest and are reared by hand, when the parents breed again. In this more humane way aigrettes are obtained four times a year.

Egypt, ē′jĭpt, a country of northeastern Africa. Its Mediterranean coast line stretches from Syria to Tripoli. Egypt, taken in a geographical sense, extends on the east to the Red Sea and reaches westward several days' journey into the Libyan Desert. A vast southern region is bounded by Abyssinia, British East Africa, Congo, and French Sudan. The total area is about 400,000 square miles.

TOPOGRAPHY. The physical regions of Egypt proper are three: The valley of the Nile, a desert region on the east, and a desert region on the west. The valley itself is divided into two portions. The southern portion is called upper Egypt. It is a narrow valley 10 to 15 miles wide, comprised between the precipitous borders of elevated table lands. The northern portion, called Lower Egypt, widens into the delta of the Nile, and is bordered by sandy plains of moderate height. About seventy miles above Cairo, there is a pouch-shaped widening of the valley, toward the west; this bay is called *Fayoum.* It is a considerable extent of fertile land. The native name of Egypt is the Black Country, a term applicable to the soil of the Nile only. A journey up the Nile

is said to be rather monotonous except near the southern end of the country, where the hills bordering the valley approach within two or three miles of the river. The cultivated lands of the valley are flat and level. The soil is of a dark brown color. The peasantry live in villages surrounded by palm trees. These villages are built on ancient artificial mounds of earth, heaped up to raise the inhabitants above the water in time of flood.

MINERALS. In Upper Egypt building stone is abundant. Limestone, sandstone, and granite are quarried in the bluffs that border the valleys. The granite of Syene on the Nubian frontier is especially celebrated. Its quarries furnished the stone for the statues, colossal figures, and obelisks of Egypt. Cleopatra's Needle in Central Park, New York City, is from this region. Bitumen, salt, sulphur, and alabaster are found in various parts of the country. Gold and iron have also been obtained from southern Egypt and adjacent parts of Nubia.

CLIMATE. Cultivated Egypt is practically a rainless country. The atmosphere is clear and dry. Rain sometimes falls near the Mediterranean. In Upper Egypt there are two or three showers a year, sometimes none at all. The country has been well called a "Gift of the Nile," for were it not for the Nile it would be a desert. In winter the climate is delightful. In summer, the days are hot, though tempered by a north wind from the Mediterranean. The spring is the most disagreeable part of the year. At this season sand storms from the deserts are very annoying. Epidemics prevail among the natives, due, it is believed, to filthy, unsanitary habits, rather than to the climate.

ANIMALS. Save for the palm groves already mentioned, Egypt is without forests. The wolf, fox, jackal, and hyena find shelter in the bluffs and prowl around the villages at night. The wild ass, several kinds of antelope, and the ostrich are still found in the deserts. The hippopotamus has been exterminated. Even the crocodile, for which Egypt was once famous, is no longer to be found, except in the extreme upper portion of the valley. There are several species of vultures, eagles, hawks, buzzards, and crows. There are numerous song birds. The pelican and the sacred ibis still wade in the waters of the upper Nile. Cats, dogs, fowls, sheep, cattle, asses, horses, and camels are the domestic animals. The river and lagoons are well stocked with fish. An ancient drawing represents an Egyptian prince standing in a hunting boat, flinging a sort of boomerang at some wild ducks as they rise from the papyrus reeds. The papyrus is now very scarce, but waterfowl still winter in Egypt. Pigeons and poultry, including ducks, geese, and turkeys are kept in small yards. In winter quails from Europe invade the country in large numbers.

FLOWERS. The rose, jessamine, narcissus, oleander, chrysanthemum, morning glory, geranium, dahlia, sunflower, and violet are but a few of the flowers found in gardens. There are, of course, no wild flowers in the cultivated districts. The famous Egyptian lotus, or blue lily, is the most noticeable flower of the Nile.

AGRICULTURE. The water provided by the annual overflow of the Nile is stored in reservoirs and is distributed by extensive irrigation systems. One canal is 4,000 years old. It is 230 feet wide on the bottom and carries a current 18 feet deep. It waters 340,000 acres. Another canal waters 1,000,000 acres. The soil is exceedingly rich. Two or three crops are raised on the same field each year. Wheat, barley, beans, peas, clover, flax, hemp, tobacco, sugar-cane, cotton, and maize, are the chief field crops. Lettuce, watermelons, cucumbers, onions, leeks, garlic, celery, radishes, carrots, turnips, cabbages, tomatoes, the egg fruit, caraway, anise, red pepper, and many other herbs and vegetables are raised in abundance. Grapes, dates, figs, apricots, peaches, oranges, lemons, citrons, bananas, and olives flourish. Indigo and madder are cultivated for dyes. The chief forage plant is clover.

POPULATION. In 1921 the population of Egypt was estimated as slightly less than 13,500,000. It is possibly a half greater than at any previous period in the history of the country. The native

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SUEZ CANAL, PORT SAID

Ocean Liners Taking on Beef

Dealers in Sugar Cane.

Merchant in Beads.

EGYPTIAN SCENES.

Egyptians have a dark complexion, but belong to the white race. They are chiefly Mohammedans, although a sect, called the Copts, numbering about half a million, clings to a form of Christianity. There is a large admixture of Turks, Arabs, Armenians, and Europeans. The mass of the population is intensely ignorant, and is poverty stricken. Efforts are being made to establish a school in each village. The prevalent language of the country is now Arabic.

GOVERNMENT. For many years Egypt was nominally a Turkish possession under a ruler called the khedive. He was viceroy of the Turkish Sultan and paid an annual tribute of $3,492,000. Egypt, however, had borrowed so much money from England and the English had such heavy interests in Egypt that the British Government was in virtual control, and the Khedive, acted under instructions of the resident British Minister. In December, 1914, England declared a protectorate over Egypt. In 1921, however, the Government of Egypt requested that Great Britain substitute for the protectorate some relation that would be more compatible with Egypt's legitimate aspirations. In February, 1922, therefore, it was announced that the protectorate would terminate in March of that year. Egypt, since then, has had the nominal status of a sovereign state, but British interests in the country are still so extensive that the Empire is dominant.

The eyes of the world were turned toward Egypt in 1922 by the discovery, in November of that year, of the untouched tomb of Tut-ankh-Amen, one of the least famous of the Pharaohs. The discoverer of the tomb in the famous valley of the Tombs, near Luxor, was the English Egyptologist, Howard Carter; he was financed and otherwise assisted by Lord Carnarvon, who died in 1923. This discovery, the archaeological triumph of modern times—an event that throws a flood of light on the social, economic and political history of a certain period in old Egypt's history—came as the crowning achievement of more than thirty years of exhaustive research. See TUT-ANKH-AMEN.

HISTORY. The civilization of Egypt is ancient. It was at one time the leading country in the world. When Greece was still a mountainous country, inhabited by rude shepherds, Egypt was a country of palaces, extensive roads, immense temples, and monumental structures, the remains of which still excite the admiration of the traveler. Grecian art owes much to Egypt. There was a close relationship as well between the civilization of the Euphrates Valley and that of the Nile.

In early days the Egyptians must have been an inventive people. From their hieroglyphic writings, pictures on monuments, and other sources of information, we learn that, long before Europe emerged from savagery, the Egyptians were familiar with many tools, such as the saw, adz, and chisel. Their physicians possessed forceps, syringes, and implements like a razor. Their artisans were familiar with the blowpipe and the blacksmith's bellows. The use of the lever, of the balance for weighing, and of the siphon for conveying liquids, was understood. Specimens of beautiful glazed pottery have been found. The warriors of the early Egyptian kings had helmets, shields, spears, maces, battle-axes, hatchets, and swords. They handled the bow skillfully. They conducted sieges and scaled walls by means of ladders. The Egyptian farmer was familiar with the use of the plow and hoe. He cut his grain with a sickle. Methods of retting flax were practiced. The fiber was made into threads and rope, and woven into cloth on a loom. Painting and sculpture were highly developed. It would be difficult to name an art or craft in which the Egyptians in their day were not leaders. The use of many articles regarded as particularly modern was not unknown to the ancient Egyptian. We even find a hint of the modern safety bicycle on an ancient Egyptian monument.

STATISTICS. The following are the latest reliable statistics to be had:

Land area, square miles.....	350,000
Land area, Nile valley and delta, square miles	12,226
Water area, square miles	2,850
Population (estimated)	13,387,000
Chief Cities:	
Cairo	790,939

Alexandria	444,617
Port Said	91,090
Tanta	74,195
Assuit	51,431
Number of provinces	19
Members of legislative assembly	92
National revenue	$223,000,000
Expenditure	$310,000,000
Farm area, acres	7,900,000
Cultivated area, acres	5,100,000
Wheat, bushels	37,011,000
Barley, bushels	11,371,000
Cotton, bales (500 lbs.)	1,251,000
Beans, bushels	10,283,000
Sugar cane, short tons	88,184
Rice, bushels	634,414,000
Imports	$275,000,000
Exports	$180,000,000
Gold, ounces	2,152
Petroleum, barrels (42 gals.)	1,042,000
Manganese ore, tons	61,000
Phosphate rock, tons	36,000
Nitrate shale, tons	4,800
Miles of railway	2,311
Number of schools	3,632
Pupils enrolled	228,997

Egyptian Literature. See LITERATURE, EGYPTIAN.

Ehrenbreitstein, ā-ren-brīt′stīn, a majestic German fortress. It is situated on a precipitous rock 387 feet above the eastern bank of the Rhine. The present fortifications were constructed in 1816-1826, at an expense of $6,000,000. The fortress is approached usually from Coblenz by a bridge of boats. The rock is precipitous on three sides, and is ascended on the fourth by a zigzag lane, flanked by heavy masonry and commanded by heavy cannon at every angle. The fortress is considered one of the strongest in the world, and is often called the "Gibraltar of the Rhine." It accommodates 14,000 soldiers. The parade ground commands a magnificent view of the Rhine and the Moselle. It was occupied by Americans after the Armistice was signed. See COBLENZ.

Eiderdown Cloth, a knitted woolen fabric with a soft, heavy nap. It receives its name from a fancied resemblance of this nap to eider down. The woolen yarn used in manufacturing this cloth is soft and bulky. Sometimes it is backed with a finer cotton yarn. After knitting, the nap is raised by "gigging" or "teaseling." Stripes and checks are produced by different colored yarns. Dots and other figures are embroidered before napping by a specially constructed machine. Eiderdown cloth is used for children's coats, hoods, robes, dressing gowns, afghans, coverlets, etc. Eiderdown cloth is made single or double faced. See NAPPING; GIGGING; DOUBLE CLOTH; KNITTING.

Eider Duck. See DUCK.

Eiffel (ī′fĕl) **Tower,** or **Tour Eiffel,** a lofty iron tower erected on the exposition grounds of Paris in 1889. The plans were drawn by Gustav Eiffel, the same who designed the framework for Bartholdi's statue of Liberty in New York harbor. The Eiffel Tower is 1,000 feet high —the tallest structure in the world. It is built of iron lattice work and is exceedingly graceful in outline. Three elevators, as well as stairways with 1927 steps, lead to its summit. The interior affords room for a number of restaurants and other enterprises. During the Paris Exposition the ascent was made by thousands of visitors, who were delighted with the extensive view to be enjoyed from the summit. Some notion of its height may be had from the statement that, allowing twelve and one-half feet to the story, the total height of the tower is equivalent to that of an eighty story building. It was so built that it still stands secure. Scientific men regard it as worth the money and cost as a station for the observation of air density, temperature, moisture, velocity of wind, etc., at different heights. It well illustrates the expansive power of heat. It is eight inches taller in summer than in winter. A wireless telegraph station has been installed in the top of the tower. The tower serves also as a kind of signal station. A system of electrical illumination flashes forth the hours and quarters.

Eight Hour Day. See LABOR LEGISLATION.

Einstein, Albert (1879-), a noted German-Swiss physicist, was born at Ulm, Wurtemburg, of Jewish parents. He spent his boyhood at Munich, where his father owned an electro-technical plant. His family emigrated to Italy in 1894, but Einstein went to Switzerland to attend school. While supporting himself as a

teacher of mathematics and physics at the polytechnic school at Zurich, he attended lectures and otherwise continued his studies, and in 1900 was appointed examiner of patents at the patent office in Berne. He became a Swiss citizen, and remained in the patent office until 1909. During this period Einstein took his Ph. D. degree at the University of Zurich; and also in this period he published the first of his brilliant papers on physical subjects, which led to his becoming extraordinary professor of physics at the University. Accepting the chair of physics at that institution in 1911, he returned to his polytechnic in the next year as full professor. Einstein's eminence in the domain of physics had so far increased by 1914 that a special position was created for him in Berlin; he was elected to the Royal Academy of Sciences, and was assured an income sufficient to permit his devoting his entire time to research. By 1921 he had received half a dozen honorary degrees from as many universities. While Einstein's name is usually associated with the abstract "theory of relativity," he has done much valuable and lasting work in the field of applied physics. He was awarded the Nobel prize for physics in 1921. See RELATIVITY.

Ekaterina, a commercial port in Russian Lapland. The town is situated 700 miles north of Petrograd, with which it is connected by a double-track railroad, and 66 miles east of the Norwegian boundary line. Owing to the fact that the Gulf Stream mingles with the Arctic Ocean at this point, Ekaterina's harbor is free from ice throughout the year, while the harbor of Archangel is ice-bound for almost 6 months of the year. Ekaterina is located in the midst of fir trees, rocks and swamps, and for half the year is enveloped in winter darkness.

Eland. See ANTELOPE.

Elasticity, that property of matter by virtue of which a body tends to return to its original shape or size after the force producing a change in either has been removed. The property is most marked in gases, while liquids show it but little. Solids are irregularly and imperfectly elastic; some, as steel, having the property in a marked degree while substances like putty are almost wholly inelastic. The most common illustration of an elastic substance is rubber, though the mathematical determination of its elasticity as the term is used in physics would give a low result; for what is measured is the force with which it tends to return to its former condition. In this sense steel would be much more elastic than rubber. Whenever a body does not fully return to its original shape or volume, the limit of elasticity is said to have been exceeded. Gases have no such limit. Elasticity may exhibit itself as a result of either compression, bending, extension, or twisting. These are made use of in some of our most delicate measuring instruments, such as weighing devices and galvanometers. The fundamental law of elasticity, known as Hooke's law enunciated by Robert Hooke in 1675, states that within the limits of perfect elasticity, the strain is proportional to the stress, or in other words, the deformation varies as the force applied.

Elba, an island in the Mediterranean. It lies between the northern end of Corsica and the mainland of Italy. It is about eighteen miles long and twelve miles wide. Its iron mines were celebrated in the days of the Romans, and are still worked. Its quarries supply a superior quality of marble and alum. It is a land of vineyards and orchards. Elba is noted in history. At Napoleon's downfall in 1814 it was a serious question of what to do with him. He was assigned the island of Elba as a residence, and also as an empire. It was proposed to give him a princely income and allow him to retain royal rank. The island, however, was entirely too small for a man of his ambition. He left for the coast of France and inaugurated the campaign which resulted in Waterloo and in his banishment to St. Helena. Elba belongs to Italy. Population, 25,480.

Elbe, ĕlb, an important river in central Germany. It rises in Silesia and empties into the North Sea. Prague, Dresden, Magdeburg, and Hamburg are its chief cities. By treaty it is open to the ships of all nations. By means of branches and nu-

merous canals it is connected with a large number of the cities of central Europe, including Halle, Berlin, and Leipsic. It is well stocked with fish. For the convenience of tugs towing canal boats, a chain has been laid in the Elbe from Magdeburg to a point in Bohemia 293 miles distant. The chain is picked up by a reversible drum, and runs lengthwise of the boat. When two tugs meet, the one going down stream relinquishes the chain until the other has passed. The dripping chain is fished up, laid on the drum, and the journey is continued. Over thirty tugs use the chain. They tow many barges.

Elberfeld, a town in Germany, 15 miles east of Düsseldorf, situated on both sides of the Wupper, and enclosed by high hills. With Barmen, Elberfeld stretches along the Wupper Valley for about 6 miles. It is a prosperous community whose chief industries are the manufacture of textiles of cotton, silk, linen, etc. There are many mills for spinning cotton twist, linen yarn and worsted, and dye works and other establishments. In the environs are many bleach fields. In 1919 the population was 157,218.

Elbruz, or **Elburz,** a mountain range of Northern Persia, which extends in a southeasterly direction for 450 miles along the Caspian Sea. It separates into many lesser ridges and encloses broad, fertile valleys. It has several peaks, the highest being Mount Demavend. Elbruz is also the name of the loftiest summit of the Caucasus.

El Caney, a town of Cuba, on the main road, 4 miles northeast of Santiago de Cuba. During the Spanish-American War it was the scene of an American victory. On the morning of July 1, 1898, 4,500 United States troops, under command of General Lawton, attacked and captured the hill and took many prisoners. The casualties were heavy on each side. In 1901 the United States government purchased the battlefield and approaches for a public reservation.

Elder, a shrub of the honeysuckle family. The flowers are small, but are borne in large clusters. In England a Christmas wine is made of elder berries. American boys are familiar with elder for popguns. We have two kinds, one with red berries and one with black. A joint of either will do. Cut the wood carefully so as not to crack it, selecting a straight piece an inch in diameter and eight inches long. Push out the large pith and scrape off the outside bark. Polish up the wood inside and out, and make a loose fitting ramrod about two inches longer than the gun. Chew up paper and drive a wad through the gun almost to the farther end. Force a second wad after the first. The air between the wads will be compressed and will expel the first wad with a loud report. The second wad may now be used for a first wad, and so on indefinitely. "Like a popgun" is a proverbial expression for that which makes a noise without producing a corresponding result.

El Dorado, ĕl dō-rä′dō, a mythical country, supposed to exist somewhere in South America. From the accounts given by the Indians, the Spanish explorers long believed a region existed somewhere in the Andes where gold was so abundant that children played with nuggets instead of marbles. Many expeditions were sent out to search for this land of gold, but, although much treasure was obtained, El Dorado was never discovered. During the gold excitement in California the region was called the El Dorado of the West. The term is Spanish, meaning gilded man, referring to the reputed high priest of this fabled region. The El Dorado myth is distinctly American, but seems related in many respects to the story of the Golden Fleece and other myths of Greece.

Election, the legal process by which the governing officials of an organization, city, state or country are chosen. Since a greater or less amount of competition characterizes all elections, it is very essential that the election machinery be guarded against those who would not scruple to use corrupt tactics to realize their ambitions; and in order that the electorate be allowed to express its real choice, the ballot form of voting is usually followed. In the United States, Canada and England some modification of what is known as the Australian Ballot Reform Law has

been adopted, but it is only in the United States that, in the choice of a chief executive, the entire voting population makes known its will.

In the United States, the President and Vice-President are chosen by an Electoral College, which, in its turn, is chosen by the voters of each state. The voters elect to the College as many members as the state has Representatives and Senators in the National Congress. Thus, for example, Louisiana, with ten members in Congress, chooses ten electors. The members of the Electoral College meet in their state and vote for the President and Vice-President by ballot.

The requirements to be met by the would-be voter in the United States differ from state to state; but when the requirements of the state constitution have been met the voter may express his will in the choice of state legislators, county and township officers, members of the National House of Representatives, and members of the Electoral College.

Elections in which the entire voting population participates are termed "direct elections;" but when the voters elect representatives only—as when they choose members of the Electoral College—the election is said to be "indirect," or "representative." The names of other elections, which are self-explanatory, are "local," "state" and "national." Elections of every kind involve great expense, which is borne by the public from the revenues provided by taxation.

Registration. The necessity of registering voters in an election some days, or even weeks, before the election is actually held, arose out of the desire to exclude every element of fraud from the choosing of officials. Owing to the fact that each state of the Union makes its own election laws, the registration requirements vary somewhat from state to state; but the underlying principle is the same. In general, the voter must give his name, place of residence, duration of residence in precinct, county and state, birthplace and date; and, if a naturalized citizen, may be required to present his papers. By this means the practice of voting more than once, or "repeating," is largely obviated. In order further to insure against this form of cheating, watchers are usually stationed at the polling places with authority to challenge the right to vote of any one suspected of fraudulent intentions.

Canada and England. The Premier of Canada is appointed to his office by the Governor-General of the Dominion; but it is required of the appointee that he first secure election to the Dominion Parliament by an unchallenged majority vote of the residents of the district he is to represent. The requirements of voters in the Dominion are designated by the provinces, and are broadly analogous to those of the states of the United States. Elections are participated in by all males of twenty-one years and over who have met the requirements.

The Prime Minister of England is appointed by the king. But when the people choose the members of the House of Commons, they have the right to endorse the Premier's administration or to refrain from doing so. Their refraining signifies dissatisfaction, and the Premier is forced to resign.

History. The history of election in its present form is only as old as the history of free government; but the right of choosing certain of their representatives has been allowed to certain elements of the population of various nations for a somewhat longer period. The ancient form hardly bore a close resemblance to the modern; and very often a shout was the means by which even the favored few signified their approval or disapproval; but it was their form of election, and was participated in with as much spirit as is the modern election in any country.

Electoral College, in the United States, a body of men intrusted with the selection of a president and a vice-president. The United States Constitution provides that the voters of the different states shall choose electors, who shall in turn select a president and a vice-president. It was the intent of the framers of the Constitution that these electors should exercise their own judgment; but as a matter of fact, they are pledged customarily to

the support of particular candidates. Each state chooses as many electors as it has representatives and senators in Congress. The number cannot, therefore, fall below three. Nevada has three. New Jersey has three. New York has forty-five Though called an electoral college, the term is a misnomer, for the electors never meet in one body. Those for each state meet at a place designated by the state legislature, usually at the capital, on the second Monday in January to cast their ballots for president and vice-president. They make three certified copies of the result. One is deposited with the federal judge of the district, one is sent by mail to the president of the Senate, the other is sent to the same officer by an official messenger, usually one of their own number. For convenience, the electoral vote of each state is given in the table accompanying the article on CONGRESS. The country has outgrown the plan, and there is an increasing desire for election of the President by direct vote of the people. See also PRESIDENT.

Electoral Commission, a commission appointed by act of Congress January 26, 1877, to pass on disputed presidential election returns from South Carolina, Louisiana, Florida, and Oregon, and one or two other states where fraud or ineligibility was charged. Samuel J. Tilden and Thomas A. Hendricks, the democratic candidates, had a majority by popular vote. Hayes and Wheeler, Republicans, had a technical majority on the face of the returns. The Democrats controlled the House, the Republicans, the Senate, and a deadlock ensued. Both sides agreed to abide by the decision of a committee consisting of five senators and five representatives and five justices of the supreme court, two Republicans and two Democrats, the four to choose a fifth member. The commission met February 1 and rose March 1. Every contested point was decided in favor of the Hayes and Wheeler electors by a partisan vote, eight to seven, the last named justice, Joseph P. Bradley of New Jersey, siding with the Republicans on each issue. See TILDEN.

Electors, in European history, a body of seven men entrusted with the election of the emperor of the Holy Roman Empire. Charlemagne, it may be remembered, was the first emperor. His successors were appointed in various ways, sometimes by an election held by a large body of representative or leading nobles, sometimes by some clique of intriguers. In 1356 a Bohemian emperor, Charles IV, with the consent of the Diet or Imperial Parliament, issued what is known in history as the Golden Bull. This document intrusted the selection of future emperors to the three archbishops of Mainz or Mayence, Cologne, and Trier or Treves, the king of Bohemia, the duke of Saxony, the margrave of Brandenburg, and the count palatine of the Rhine, as a college of electors. Each of these seven dignitaries was known henceforth as an elector. When acting together they formed the college of electors. The terms gave rise to some confusion. For instance, the elector of Cologne and the archbishop of Cologne are one and the same person. During the Thirty Years' War, the duke of Bavaria was permitted to assume the title of elector. In 1692 the ruler of Hanover was added to the college, bringing the number of members up to nine. The college was abolished by Napoleon.

Electric Battery. See BATTERY; ELECTRICITY.

Electric Furnace. See ELECTRIC HEATING.

Electric Heating. The use of electricity for various heating purposes, including its industrial use in furnaces specially designed for the conversion of electric current or energy into heat. When utilized in this manner electricity is much more efficient than when used for lighting purposes, as a much greater proportion of the current employed is converted into heat. See ELECTRIC LIGHTING. Electrical energy readily changes into heat, and one of the difficulties found in the use of electrical heating apparatus, from the largest to the smallest, is that of keeping the parts sufficiently cool to prevent danger from overheating. Every housekeeper who has used an electric iron or electric toaster is aware of this fact, while in the case of

large electrical apparatus the problem is to prevent the insulation from being destroyed by burning.

Many electrical appliances are now used for domestic heating, including radiators, electric irons, ovens and hot-plates, kettles, etc. These appliances derive their heat from wires or very thin plates of metal or other suitable material, through which the electric current is passed from convenient connections in sufficient strength to make them glow. Electric radiators for house-heating may be practically the same as incandescent lamps in design and construction, furnished with a concave disk of copper or some other metal to reflect the heat; or they may consist merely of wires wound on a refractory material, and exposed to the air. In electric irons, etc., the conducting wires or thin metal plates are usually imbedded in asbestos or mica, with a metal cover which comes in contact with the article to be heated. Many cooking operations are performed by electricity, and there is a great variety of apparatus for this purpose, electric ovens being used by the largest bakery establishments, as well as in the home. There are electric foot-warmers for the automobile, electric gluepots, soldering apparatus and cigar-lighters, and electrically heated bed-quilts and clothing. The airplane pilot, in the low temperatures of high altitudes, may keep comfortably warm in a suit of clothes, gloves, etc., heated by means of hidden wires insulated in the material and supplied with electric current from a dynamo driven by a small propeller which revolves with the flight of his "ship."

Electric Furnace. The electric furnace is the most important development of electric heating employed in the arts and manufactures. Great amounts of electrical power are generated for industrial use in furnaces which have revolutionized methods of production in many lines. Iron is now smelted in huge quantities and converted into high-grade steels in electric furnaces; most of our aluminum is produced by this means; also the calcium carbide which furnishes acetylene gas, the hardest abrasives and the fertilizers compounded with nitrogen abstracted from the air. These furnaces may be classified according to the method in which the heat is produced; thus there are "arc" furnaces and "resistance" furnaces. The arc furnace consists usually of an electric arc (see Electric Lighting) with carbon electrodes inclosed in a chamber of fire-brick, chalk, or some other material which is highly refractory and also a poor conductor of heat. In the resistance furnace, on the other hand, heat is produced by passing electric current through some highly refractory material as carbon or a suitable metallic oxide imbedded in the wall of the furnace; or the material to be treated may itself be used as the conductor of the current. A simple form of resistance furnace is that used in the production of carborundum. This consists of a trough built of loose bricks, with large carbon electrodes projecting through the end walls. Between these is a core of coke, carbon rods or granular carbon; and around this core is packed a mixture of powdered coke, sand, and a little sawdust and common salt. When the electric current is turned into the electrodes from the dynamo or other source of power, it flows through the core and raises the temperature of the mixture of sand and coke to the point required for the combination of the silicon in the sand with the carbon to produce carborundum. The conversion takes place in about 36 hours in the electric furnaces at Niagara Falls, which are about 15 feet long by 7 feet wide and 7 feet high, with electrodes consisting of bundles of sixty 3-inch carbon rods and a coke resistance core 9 feet long by 2 feet in diameter. It requires about 1,000 horse power to operate such a furnace. The commercial use of the larger types of electric furnace is practically limited to processes in which an extremely high temperature is required, or where it is necessary to maintain the purity of substances under treatment. The most favorable location for them is where electric power can be obtained at low cost; although small electric furnaces are used for a variety of manufacturing purposes wherever central-station power is available.

Electric Lighting, the use of the electric current for purposes of illumination,

through the agency of incandescent or arc lamps. This adaptation of electrical energy to human needs has given the world its most convenient form of light. The basic discovery of electric light was made in 1810 by Sir Humphrey Davy, who observed the properties of the electric arc and also produced incandescence in a fine platinum wire during his experiments with a battery of 2,000 cells. The first electric lamp used in regular service was an arc lamp installed in a lighthouse at Dungeness, in the Straits of Dover; but it was not until the dynamo was developed that arc lighting on a commercial scale became possible. In 1878 Charles F. Brush of Cleveland, Ohio, devised the first complete system of electric lighting, which included a special form of dynamo and a self-regulating arc lamp that could be operated in series. The Brush system, with improvements, is still in use; also a number of others that furnish arc lighting for streets, halls, factories, railroad stations and wide spaces generally.

The incandescent electric lamp was devised by Thomas A. Edison and first exhibited in 1879. His invention comprised all the essentials of electric current generation and distribution by means of lighting circuits, as well as the first practical "bulb" lamp, now familiar in the home. In 1882 the first Edison central station was opened in Pearl Street, New York, and a new era of artificial lighting began. A "central station" is a plant for the generation of electric current to supply many consumers on a commercial basis, and the current may be used for power and heating purposes as well as for light. By means of high-voltage transmission lines, electric service may be furnished at great distances from the central stations; thus the power stations at Niagara Falls have transmission lines radiating to many cities, some 200 or 300 miles distant, to which lighting and power service is furnished. In all large cities there are central stations of great capacity, the largest electric light, heat and power system in the world being that of the Commonwealth Edison Company, Chicago. This system includes several great central stations, with numerous substations, the current being distributed in underground cables at a voltage varying to suit local needs.

When an electric current is forced through a fine wire that can stand high temperatures without melting, the resistance offered by the wire causes the generation of heat, and this is partly converted into the form of energy called light. This is the cause of light in the incandescent electric lamp. In its modern form, a fine wire of tungsten is inclosed in a glass bulb from which the air has been exhausted to prevent the melting of the metal by combination with oxygen. The wire, by its resistance to the current, becomes white hot and brilliantly luminous. The earliest form of incandescent lamp had a carbon filament, which gave a yellow light.

In recent practice electric-light bulbs may have a little gas admitted to them after the atmospheric air has been exhausted in the process of manufacture, and such lamps are known as "gas-filled." They prove more economical in use, because the addition of the gas gives a more brilliant light for the current consumed. Consequently, the gas-filled lamp, which is now made in sizes up to several thousand candle-power, has largely replaced the arc lamp for general lighting purposes, even in city streets.

The principle of the arc lamp is an interesting phenomenon of electricity. In this form of lamp two carbon pencils, connected with an electric circuit, are kept automatically point to point, with a slight gap between them. The current causes the tips to become white hot, and in leaping the gap the current carries with it a continuous stream of luminous atoms of incandescent carbon. This is called an arc because the path of the atoms is curved. The luminosity is intense and the arc lamp furnishes a powerful light. Its rays proceeding from a small area can be easily focused by means of lenses and mirrors and projected to a distance as a single strong beam of light; so that arc lights are generally used for projecting moving pictures to a screen; also for searchlights and lighthouse lamps, some of the latter having as high as 90,000,000 candle-power.

One of the most powerful arc lamps on record projected a beam that was visible for 60 miles, and by its light a newspaper could be read at a distance of 35 miles.

Electric lighting, though cheap where current is cheaply obtainable and generally satisfactory as an illuminant, especially when compared with the methods that preceded it, has not yet reached the point of development that satisfies the scientist. Only about five per cent of the current required to produce it is really converted into light; the rest is dissipated as heat; and when coal is used to produce the electric current, only about one per cent of the fuel energy is represented by the illumination that results. Evidently therefore much remains to be accomplished in the field of electric lighting.

Electricity, one of the many forms of energy, such as heat, light, etc., which are governed by their own laws and have distinctive phenomena. Among the phenomena of electricity are attraction and repulsion, chemical decomposition of various substances, and others of great importance to man. The name is taken from the Greek word for amber, "electron," and was first used in 1600 by William Gilbert, the creator of the science of electricity, from the fact that a stick of amber rubbed with a piece of woolen material was found to have the property of attracting small pieces of paper and other light bodies. Gilbert was the first to distinguish clearly between magnetic and electric action, and following him for a long period of time many scientists conducted experiments which led to gradual advance in the science of electricity. Among these were Sir Isaac Newton and Robert Boyle, who first showed that electric attraction takes place through a vacuum. Otto von Guericke invented a rude form of electrical machine, and also discovered electric induction; but it was not until the middle of the eighteenth century that man found the means of producing electric currents at will.

The Leyden jar was discovered in 1746 by accident, and public exhibitions of electric phenomena were popular when Benjamin Franklin in 1750 proposed an experiment to test his theory that lightning was an electric phenomenon. The actual experiment was carried out in France, where a long pointed wire was extended upward from a steeple, to see if electrical charges could be observed at the lower end of the wire when a thundercloud passed overhead. This was in 1752 and in the same year Franklin performed his famous kite experiment, after which lightning rods, suggested by Franklin, became popular in Europe and America.

In the nineteenth century great advance was made in electrical science, as the phenomena, properties, and possibilities of electricity became more generally and more accurately known. Henry Cavendish discovered many important facts regarding it, and the names of Coulomb, Ohm and Faraday, Galvani and Volta, were added to the list of electrical scientists. To Faraday we owe the statement of the laws of electrolysis. Then came the work of Daniell, Grove, Bunsen and others, and the nineteenth century saw marvels worked by electricity for man's accommodation. The first telegraph instrument was constructed about 1825, the first induction coil in 1838, and then came the electric light and Edison's useful applications of electric current, down to 1888, when Hertz investigated the properties of the waves of ether set up by electricity, now utilized in radio-telegraphy and telephony as the result of the work of Marconi and others.

Conductors and Insulators. Early experiments in electricity, continuously advancing, led to the knowledge that all substances fall into two great classes as regards their electrical properties. These two classes of bodies are called conductors and non-conductors, or insulators. All bodies will produce electricity by friction, but the conductors require to be insulated from the ground and surroundings by the class called insulators, to prevent the electricity escaping. All bodies will conduct electricity, but first-class insulators offer so great a resistance to its passage that a current at an enormous tension is required to traverse them, and for practical purposes they are as efficient as real non-conductors, did such exist, with currents up to fairly high tension.

Positive and Negative Electricity. It was at first thought that there were two kinds of electricity which were called positive and negative; but later it was discovered that all electrity was the same in kind, though different in degree. The old names, positive and negative, are still retained, but are now used to imply that if one body is electrified to a higher degree than another, they are positive and negative to each other, and only in that relation.

Electric Battery. Up to the discovery of the voltaic cell by Volta, all experiments had been carried out with electricity produced by friction, in machines fitted with cylinders of different materials that, when rubbed, produced electrical energy which could be collected. Machines made on the same principles, called influence machines, are still used for experimental purposes where a current is required of high voltage and small amperage,—these being terms which will be explained presently.

With the advent of voltaic cells, which are now called primary cells, a new field was opened for experiment. A current of electricity produced in a primary cell is due to chemical action. With certain substances, such as zinc and carbon, or zinc and copper, placed together with an acid in certain positions, it was found that certain changes occurred in their chemical composition, and these changes produced a flow of electricity from the substance most acted on to that which was least acted on. The chemical action which takes place in these cells is analogous to that which takes place in a furnace. One of the elements is fuel, and as it is consumed in the cell, electrical energy is developed.

The discovery of secondary cells, or accumulators, often called storage batteries, is due to Ritter and improvements by Planté and Faure. The action in these cells or batteries—a battery being properly a collection or series of cells—is also chemical, but with this difference, that by passing a current of electricity through them from an outside source, it is possible exactly to reverse the chemical changes that have taken place during discharge, thus reproducing the original conditions. With these storage batteries, so called, it was found possible to store the energy derived from primary cells, and then, by connecting up the cells in different ways, to obtain a current of any amperage and voltage that might be required.

Uses. The last great fundamental discovery which we may note resulted from combining the phenomena of magnetism with those of electricity in a machine, called a dynamo, in which the lines of force between the two poles of a magnet are continuously cut by coils of insulated wire, thereby inducing a current of electricity to flow in the wire, which can be collected and utilized for outside purposes. This is the method employed in producing and distributing electric current for the modern commercial requirements of light, heat, and power. The uses of electricity, however, are now so wide and varied that it is possible here to mention only a few of them, as for instance the various purposes to which it is applied in connection with motor cars. These are, briefly, ignition, lighting, starting, heating, and motive power, the latter in electric vehicles. The principal instruments employed for these purposes are primary and storage cells or batteries, induction coils, dynamo and magneto machines, and motors. In the modern household electricity has many uses, all contributing to human convenience or comfort, while modern machinery is largely operated by electric power, and we live in an electric-lighted world, communicating with one another freely by means of electricity over innumerable wires, and listening daily and nightly to the finest music, the most eloquent speeches, sermons, stock quotations, health advice and national news, broadcast from electric stations and borne on Hertzian waves and the power of electricity to our more or less attentive ears. It is an age of electrical wonders.

Units. The three units of measurement in electricity most useful to remember are: (1) The volt, which expresses the force or pressure of the current, just as the pressure of steam or water is expressed in pounds per square inch. The unit of the volt is

calculated by the pressure or difference of potential which will send a certain quantity of current, defined as one ampere, through a resistance of one ohm. (2) The ohm, or unit of resistance which the conductor offers to the flow of current. The ohm is calculated by the resistance of a certain length and thickness of a column of mercury having a known cross-sectional area, and a known length at a fixed temperature. (3) The ampere, or the unit of a current which is induced to flow from one body to another by a difference of potential of one volt between them, through a resistance of one ohm.

These three units of electrical measurement are connected in the following equation:

$$C \text{ (Current in amps.)} = \frac{E \text{ (Electric force in volts)}}{R \text{ (Resistance in ohms)}}$$

If two bodies having a difference of potential between them of 4 volts are connected by a wire having a resistance of 2 ohms, a current of 2 amperes will flow in the wire.

High and low tension are merely comparative terms. For instance, these terms are used to discriminate between the two currents of different potential required for electric ignition in a motor car, and merely mean that the one is at a very much higher voltage than the other, for there is no hard and fast line dividing them.

Currents. Electric currents are commonly described as constant or alternating. In the first case, there is an electromotive force which is constant; while in alternating currents, the electromotive force impressed upon a conducting circuit is not constant, the flow of current varies, and there are complications due to induced currents. The simplest case of alternating current is seen where the electromotive force is exerted at regular periods, as the motion of a pendulum is exerted, rising to a maximum, decreasing to zero, becoming negative, then rising through similar stages to the maximum again, in which case we get the regular alternation of E. M. F. (electromotive force) and currents.

Induction. Electrical induction, or induced currents, occur in the following manner: If a charged body is brought near an uncharged one which is separated from the earth by a non-conductor, or in other words is insulated, electrical forces are set up and may be observed near the latter of the two bodies. It is then said to be charged by "induction." If the body which was originally charged was positive, the portion of the other body nearest to it becomes negatively charged, and the portion farther away is positively charged. Exactly the reverse occurs if the body which was originally charged is negative. When the charged body is removed to a distance the "induced charges" will disappear.

Electric Light Bug, our largest bug. So named from its habit of dashing at electric lights. It is an equatic bug, and is properly called the giant waterbug. It lives on minnows, small frogs, tadpoles, and the like, which it holds with its front legs while it sucks out the blood. The waterbug sticks the tip of his abdomen out of the water to breathe, as its breathing spiracles, corresponding to nostrils, are, insect fashion, situated along the sides of the last segment of the body. An interesting feature is the peculiar construction of the front leg, the second joint of which shuts into a groove in the upper joint like a blade into the handle of a knife. At night waterbugs often come up out of rivers and ponds and fly about, being particularly attracted by street lamps; but, no accident preventing, they are back in the water by dawn of day.

Electric Welding, a process of welding or joining metals in which the electric current is utilized as a source of heat. There are two methods of electric welding; first, by the resistance of the joint to the current, which induces heat and softening of the metal to the point of stickiness; second, arc welding, in which a carbon electrode is used to convey the current and melting in metallic rods, as in joining fishplates to rails, or using an electrode of metal which melts off and forms the connection between the parts to be joined. Electric welding is used for joining the ends of street-railway tracks to make a continuous rail. The equipment for this

purpose may consist of an air compressor and sand blast, by which the rails are thoroughly cleaned at the joints after removing the splice plates, and the welding apparatus, which is simply a large electric transformer with jaws that can be clamped upon the rail. A bar of steel is clamped to the rail on each side by means of these jaws, with a pressure of about 1,400 pounds. The electric current being then turned on and continued for about two minutes, sufficient heat is generated to cause the metal of the bars and rails to flow and unite firmly, under pressure, as the joint cools.

Electric welding is especially useful for repairs to heavy machinery. During the late war, when enemy vessels interned in American ports were damaged by their crews by having their boilers and engines rendered useless, they were patched and repaired most effectively by electric welds, and soon returned to service. The electric weld is also replacing the rivet in many processes of manufacture and construction. The steel plates of large vessels are now sometimes joined together by welding instead of riveting, and many articles of household use are electrically welded. To make a "spot" weld, the parts to be joined are brought together under pressure, between the points of electrodes connected with an electric circuit. The local heat generated by the current causes the parts to melt and unite in the area between the affected parts. In this way a short bar may be firmly affixed to a thick plate, so as to project from it, without drilling a hole in the plate and threading it in. By pressing the bar against the plate and applying electric current of sufficient voltage to both parts, a strong weld can be made. These examples indicate only a few of the many ways in which electric welding is utilized by the modern engineer, builder and manufacturer.

Electrification, the substitution of electricity for steam or other motive power in the operation of railway lines and terminals, or for industrial uses. The electric locomotive is of comparatively recent origin, but its use is being extended rapidly. Steam railroad trains are now hauled into New York City by electric locomotives operating through the tunnels under the Hudson River, and great railroad terminals in Chicago and other cities are in process of electrification, which has many advantages for this purpose, including the elimination of smoke and dirt. An electric train, or train hauled by an electric locomotive, can pick up its speed much more quickly than a steam train. This makes electric traction most desirable for both city and suburban lines of railway, where stops are frequent and the traffic is heavy. Experience has shown that on lines converted from steam to electric traction the average or schedule speeds have been increased 20 to 50 per cent.

Suburban electric trains are usually operated by motors distributed among the cars, instead of using a separate locomotive. Thus there may be two electric motors, each of 200 horse-power, under every other car, giving a total motive power of 1,200 horse-power in a six-car train. This amount of power enables engineers to build railway lines for electric operation with much heavier grades than would be possible with steam power. Any number of cars may also be coupled together in a train operated by electricity, under what is called the multiple-unit system, without reducing the capacity for speed, as each motored unit contributes its proper proportion of power and at the same time all the motors are as easily controlled by the driver or motorman as they would be if grouped in an electric locomotive. The Panama Canal is fully electrified, and the largest ships are towed through its locks by means of electric locomotives.

In the United States and on the continent of Europe, the electrification of main railway lines has been developed to a considerable extent. In Switzerland and Italy many of the state-owned lines have been electrified, and the tunnel sections through the Alps, including the St. Gothard tunnel line, are operated by electric locomotives. It is in the United States, however, that the electric locomotive has been developed to the greatest power and is used over the longest stretches of track. The Chicago, Milwaukee & St. Paul Railroad

has been a pioneer in this development, and now operates over 800 miles of its western divisions, including sections through the Rocky Mountains and the Cascade Mountains, with electric passenger and freight locomotives that attain as high as 4,000 horse-power. The electrified divisions include many long and severe grades, tunnels and sharp curves, but these are negotiated with ease by the monsters of electric power, and average running times have been cut down one third since electrification of these lines. In severe winter weather the electric locomotives have another advantage, as they do not get frozen up when at rest, as railroad steam engines frequently do. Electric current is supplied to these divisions of the St. Paul railway by power-houses and sub-stations, the latter being located at intervals of about 30 miles along the line. The power-houses produce alternating current at 100,000 to 110,000 volts, for transmission to the sub-stations, where it is "stepped down" and converted into direct current at 3,000 volts, then conducted by overhead wires to the electric locomotives, which receive the current through a large crate-like trolley.

On the Norfolk & Western Railroad, a coal road, trains of 3,250 tons are now hauled up stiff grades by two electric locomotives at double the speed formerly attained with a similar load by three of the largest steam engines built, and there are many other instances of this development of electric traction. The secret of the electric locomotive's superior power lies in the fact that a much greater part of its total weight consists of apparatus that turns its wheels, as it derives its energy from outside itself, namely the power-house, instead of having to carry a heavy boiler to produce its energy in the form of steam. The great success of electric traction in the United States, especially in the mountainous regions of the West, inaugurated a new era in railway history. It is an interesting fact that both in America and in Europe the power needed to pull trains up mountain slopes, around curves and through tunnels is created by means of water turbines operating power-houses, often miles away. Thus nature has provided man with an alternative to the use of coal as fuel, for where coal deposits are lacking water power or "white coal" may be utilized for the transport of passengers and freight.

Many people have thought that electric traction was slower than steam, especially when they knew it only on street railways and suburban roads. But the highest speed ever made on a railway, 131 miles an hour, was attained by an electric locomotive in 1903. This was on a track specially prepared for the test; but where long stretches of main-line railway are electrified, speeds as high as 60 miles an hour are made with ease. There is also a great saving in fuel on electrified lines.

Since the St. Gothard tunnel line through the Swiss Alps was converted from steam to electric operation, the passage of the nine-mile tunnel has been much quicker and more comfortable for travelers. The electric locomotives used comprise four 450 horse-power motors, and are able to haul a 300-ton train up a grade of 1 foot in 38 at speeds up to 30 miles an hour, while for short periods this kind of locomotive can develop 2,500 horse-power. The railway through the Simplon tunnel in the Alps, which is 12 miles long, has also been operated by electric power since the tunnel was completed in 1906. For switching in freight yards the electric locomotive offers many advantages, and it is probably only a question of time when most large yards and railway terminals will be operated in this manner. The development of water power systems, like that at Niagara Falls and Keokuk, Iowa, will contribute largely to this result.

Electrochemistry, the science which treats of the agency of chemistry in effecting chemical changes. It is generally divided into two branches, namely, (a) electrolysis, or the separation of a compound body into its constituent parts by the passage of an electric current, and (b) electrometallurgy, or the application of electricity to the metals in the arts and industries.

The extensive use of the electric current in the field of industrial electrochemistry naturally dates from the time of the production of current on a commercial scale, which began with the present generation. Amer-

ica has played an important part in this development, and the skill and perseverance of great American chemists are attested today by the vast electrochemical industries at Niagara Falls and elsewhere on the continent, where water power has come to their aid.

In chemical work the electric current has the two distinct uses indicated above. First, its use upon substances in liquid form, either in solution or in a melted state; second, its use as a source of heat. The first is its electrolytic use; the second, the electrothermal.

ELECTROLYSIS, or the electrolytic action of the current was first used commercially in electroplating metals, and it is still widely employed for this purpose. Among the metals which are electrically coated upon others are gold, silver, copper, zinc and nickel. Plating with an alloy, such as brass from a cyanide solution of both copper and zinc, is also accomplished by electric current. In simple forms of electroplating apparatus, an adherent film of metal is deposited upon the metal to be plated by the passage of current through a bath containing a solution of the metal. This metallic bath may itself form the battery, as in plating with copper, but the more common plan is to employ a current from some outside source, as a battery or dynamo. Thus, metal articles to be electroplated, such as table cutlery, building or car fixtures, lamps, etc., are suspended by wires from a metal rod laid across the top of the bath and connected with the negative pole of the battery, this terminal of the current forming what is called the cathode. The silver, nickel, copper, etc., to be deposited is suspended in like manner from a rod connected with the positive pole of the battery, and this terminal is called the anode. Chemical action set up by the electric current results in a deposit of a thin metal coating on the articles suspended in the bath, and this deposition of metals by electrolysis forms a part of several important arts.

Electrolysis is also used for the refining of metals, and surpasses every other process for the production of pure copper, a purity of 99.9 per cent being obtainable by this means. Other metals, including gold, silver, lead, nickel, bismuth and antimony can also be refined in this way. But aluminum is probably the most important metal obtained by electrolysis, which in these cases takes the form of deposit in the electrolytic bath without adhesion, as in electroplating. The aluminum contained in its commonest ore, bauxite, requires a high-power current to set it free, and it is consequently cheaper to bring the ore to a point where electricity can be cheaply obtained, as at Niagara Falls. In 1883 the yearly production of aluminum in the United States was 83 pounds. Now, thanks largely to electrolysis, it is more than a million times as much. Silicon is also prepared by electrolysis.

This use of the electric current finds another important channel in the production of a number of commercial salts. Thus from common salt and the electric current as a beginning, metallic sodium, chlorine, chlorates, hypochlotites and hydrochloric acid may be prepared, the hydrogen and oxygen when needed being furnished by the water employed in the process. To prepare metallic sodium, fused salt and a mercury cathode are used.

When water containing a small amount of sulphuric acid is subjected to electrolysis, hydrogen and oxygen are liberated; and these gases are now collected and put on the market on a commercial scale. A large number of compounds, including chloroform, have also been produced by the use of current, though not yet in commercial quantities.

ELECTRIC HEATING. On the electrothermal side, this branch of chemistry has given us the electric furnace, by which the highest known temperatures have been secured and controlled for various industrial purposes. It was first successfully used in 1883, and some of its products since that time include valuable carbon compounds, nitrogen compounds, iron and steel alloys, and a variety of products such as phosphorus, ozone, alundum, etc. Calcium carbide was produced in 1889 by heating a mixture of coke and lime in an electric furnace, and this later became a valuable source of acetylene; while under the stress

of the World War this acetylene was transformed into acetone, cellulose acetate, and other materials much needed in the manufacture of explosives and "dope" for airplane wings.

There are over 233 electric furnaces in use in the United States for making alloy steels, with a production exceeding 750,000 tons annually, including ferrochrome for armor plate and ferro-tungsten for tools which hold their cutting edges at high temperatures. And in 1919 the president of the American Electrochemical Society said: "No one now doubts that we shall soon attain to supersteel, and it is no less clearly indicated that this will be accomplished by the electric steel furnace and electrically produced alloys. Such steel produces rails which do not break and plates which do not fracture. The alloy steels have made possible the modern automobile, the airplane engine, and the farm motor tractor." During the war the United States government invested a billion dollars in electrochemical plants; and there is little doubt that this comparatively new application of electric power will have an increasing effect upon American industry.

Electrocution, a method of inflicting the death penalty by passing a powerful electric current through the body of the convicted criminal. This means of executing criminals was adopted by several states of the Union as being less brutal than hanging or some other method. The condemned person is strapped into a specially constructed chair; one electrode is applied to the top of the head, the other to an ankle; and a current of about 2,000 volts is passed through the body, death ensuing instantaneously. The states in which this form of execution is prescribed are Oklahoma, Virginia, Arkansas, Indiana, Ohio, Massachusetts, Pennsylvania, Nebraska, Vermont and New York.

Electro-magnet, a temporary magnet made by a current of electricity. If a wire carrying an electric current be wound about a rod of soft iron the core becomes a magnet. If the current be cut off, or if the iron be removed, the latter ceases to be a magnet. In physics, the wire so wrapped is called a helix, the iron rod is called the core, and, so long as the core is magnetized, it is an electro-magnet. Any body attracted by a magnet is called its load. Wrap the wire of an electric lamp around a soft nail, turn on the current, and the nail becomes a magnet. Turn off the current, and the nail loses its magnetism. By turning the current off and on, the electro-magnet may be made and unmade at will. When a telegraph operator works the lever of his key, he is making and unmaking the electro-magnet of the receiving instrument miles and even thousands of miles away. The rapid clicking indicates that the magnet is seizing and releasing its load.

A huge magnet, possibly shaped like a cheese, and often no larger than a wagon wheel, suspended from the arm of a crane and controlled by a powerful electric current, is capable of doing marvels. Lowered over a pile of scrap iron, such a magnet picks up metal large and small,—an iron filing or a ton casting, it is all the same to the magnet. The crane swings, the load is dropped, and the magnet swings back for another load. Foundries find that in this way they can handle scrap iron at a fraction of the former cost. Pig iron, too,—bars under which a man staggered, —are handled like matches. A fifty-ton car of pig iron can be unloaded in half an hour.

By arranging an overhead track for the hangings to travel on, the lifting magnet is used to carry kegs of nails. The contrivance trundles to and fro, lifts a dozen kegs of nails, carries them to their destination, and drops them in place. All the operator has to do is push a lever when the load is in place to be dropped. The lift magnet is a cheerful worker. It will drop a huge bar or iron into the hottest flame, or pull it out again without a word of complaint. It is never tired, never burns its fingers. A fifteen ton burglar-proof steel safe is a hard article to get hold of,—a hard article to handle. It is impossible to get men enough around it even to budge it, but the magnet lifts it and carries it away without an apparent effort. Huge steel ship plates forty feet long are carried to the frame and are held

in place until they are riveted safely. The uses of the lift-magnet are so manifold, and it use does away with so much grimy, exhausting labor, that large machine shops, foundries, shipyards, and wholesale hardware stores are not considered up to date without electrical lift-magnets. The electric-magnet is also used in the manufacture of small articles such as screws, pins, needles and other articles made by automatic machinery.

Electromotive Force, literally, that force which causes electricity to move, or in other words, the immediate cause of an electricity current. It is sometimes used as equivalent to difference of potential. As abbreviated to E. M. F., it is employed largely in physics and in electrical calculations. The commercial unit is the volt which practically equals the electromotive force of a Daniell cell. See POTENTIAL.

Electrotype, a metal cast of type or of an engraving made by an electrolytic process. An impression of that which is to be copied is made in wax or some similar material, sprinkled with graphite to make it a conductor, and attached to the negative terminal in a copper solution. After the current has passed for an hour or so, the cast is removed from the electrolyte, the thin film of metal removed from the mold and filled with lead. This is planed down parallel to the face and mounted on a wooden block to give it the proper thickness. Electrotypes are now generally used in printing books, newspapers, and magazines, both for pages of type and for the illustrations, instead of using the type or engravings themselves.

Elegy, a variety of lyric poetry which is expressive of grief. The elegy is called forth usually by the death of some individual; but serious reflection upon mortality is also the theme of elegies. Gray's *Elegy in a Country Churchyard,* Milton's *Lycidas,* Shelley's *Adonais,* and Tennyson's *In Memoriam* are the most noted elegies in the English language. See POETRY.

Elements. See CHEMISTRY.

Elephant, the largest land animal now living. A well grown male is from eight to ten feet high at the shoulder and attains a weight of 10,000 lbs. The hide is thick, wrinkled, and sparsely covered with hair, placing the elephant among the thick-skinned animals, to which the rhinoceros, the hippopotamus, and the pig also belong. The general color is bluish or slaty gray. To support so heavy a body the elephant is provided with colossal straight legs, to which the name columnar, from their resemblance to the columns of a temple, is sometimes applied. The elephant not infrequently sleeps leaning against a tree or a cliff, as though slumber had overtaken it while scratching itself; but it lies down with the utmost ease, sprawling with its legs comfortably extended forward and backward. Despite its great weight it rises easily. Its gait is a shuffling walk, which may be increased in speed to very nearly that of a horse, but cannot be changed into either a trot or a canter. Even in its lumbering charge upon a luckless hunter it performs a double-quick shuffle. The ease with which the elephant sprawls or allows its body to sink to the ground is of the utmost advantage in ascending or descending mountains, in which, despite its heavy bulk, it quite excels the horse in speed, security of foot, and in ability to climb where the ascent is so steep that a horse remaining erect on its legs, would fall backward. The skeleton shows that each foot is provided with five toes, but the entire foot is contained in a flexible, muscular, tough-soled sack, through the edge of which five horny, claw-like hoofs project slightly. The flat foot makes a track as large as a half-bushel measure.

The neck is very short and stiff. The head is large, affording broad surfaces for the attachment of the muscles of the trunk. The forehead is broad and benevolent in appearance, corresponding to the elephant's well founded reputation for intelligence; but, if the truth be told, the brain capacity within is actually quite small. The skull is very thick, and is honeycombed with air passages reducing its weight.

The most peculiar feature of an elephant is its nose or trunk, the tip of which, containing the nostrils, is extended eight

feet, easily touching the ground when the animal is standing erect. The trunk is an exceedingly strong, lithe, tough, sensitive organ, composed, anatomists say, of 40,000 distinct muscles of varying size and delicacy. The uses of the trunk are various. With this instrument the elephant is able to grasp leaves and twigs, otherwise above its reach, and to lift food from the ground and tuck it into its mouth. Its customary food consists of grasses and rice, which it pulls with its trunk and cleans from dirt by flogging the roots against its front legs. Sugar-cane is its delight, although the elephant of the menagerie must be content with about 200 pounds of hay and carrots. In drinking, the elephant fills its trunk and discharges the contents by blowing into its mouth. By using its trunk as a trumpet the elephant makes itself heard for miles. In its native jungle the elephant has a keen scent for food or enemies. Its large, pendulous, lopsided ears, shaped like the leaf of a begonia, catch the slightest sound. Its natural enemy is the tiger, which it seizes with its trunk and flings against a tree or tramples under foot in a fine rage. It is said that the mere sight of a dead tiger throws an elephant into a fury. Two incisors of the upper jaw are prolonged almost directly forward into huge tusks which sometimes attain a weight of 150 or 200 pounds each.

The elephant has long been domesticated. It was employed by the Carthaginians, as may be remembered, in their wars, and is used at the present time by the natives of India chiefly in conveying and piling lumber. An elephant is able to balance a timber of several hundred pounds' weight on its tusks and guide it through a forest path to the water's edge. When employed in a lumber yard it shows great intelligence. It will lift and carry heavy timbers, piling them up with exactness for hours at a time without the least suggestion. The magnates of India ride on the elephant's back in a sort of box or saddle called a howdah. The driver or mahout sits astride the elephant's neck, guiding its movements with his voice and a sharp gad.

Elephants roam in herds under the guidance of an old male. They prefer a mountainous or at least rough forest country, and are still found in Africa, south of the Sahara, and in India south of the Himalayas. As stated, their food is entirely vegetable. They are exceedingly fond of playing in water, which they spout over themselves and companions with extreme delight. The elephant is a strong swimmer, not infrequently sinking so that only the tip of its uplifted trunk is visible above the surface. It is able to regulate its depth by inhaling or expelling air.

The elephant lives to an age of 100 or, it is said, even 200 years. The young elephant has her first calf at fifteen, or some say thirty years of age. A single calf is brought forth every six years. In suckling the young stands or sits directly in front of the mother who fondles it most affectionately with her trunk. Young are seldom produced in captivity, nor do they seem to thrive away from their native jungles.

The laboring elephants of India are recruited from the wild herds. Captives are taken in different ways. Sometimes two or three hunters lay cables knotted into snares in the path of a herd. When they have succeeded in tying the hind legs of an elephant to a tree they camp with him for weeks if need be. After his rage has been subdued by hunger and severe punishment, kinder measures are resorted to, and sweet cane is offered the prisoner as a reward for every sign of good behavior, until finally they are able to lead their captive home thoroughly subjugated. Sometimes tame female elephants are taken into the jungle. While they attract the attention of a wild male, and fondle him with their trunks, as they have been taught to do, the hunters tie his hind legs together and carry cables to adjoining trees. The thoroughly enraged prisoner is then treated as above. Sometimes herds are captured by driving them into enormous strong stockades made of the trunks of trees set upright in the earth and lashed together. The females are restored to liberty. From these accounts one gets an idea that the elephants of India are only partially wild.

Menagerie elephants are obtained chiefly from dealers in the city of Hamburg. A good specimen is worth $1,250 to $2,500 on board ship at that port. Save under rare circumstances, the elephant, when once tamed, is affectionate and kindly, becoming very much attached to its driver, and permitting the caresses of children with evident satisfaction. It is said that if a child falls asleep in the path of an elephant carrying timbers, it will step over the little body, lifting each foot with the utmost care.

For some account of extinct elephants well adapted to living in an Arctic climate, the reader is referred to the article on the MAMMOTH. See also MASTODON; HIPPOPOTAMUS; RHINOCEROS; IVORY; TEAK; SIAM.

Elevator, in agricultural countries, a building used for handling grain. An elevator differs from a warehouse or a granary in that it has special facilities for obviating labor. First of all are the elevators to which farmers draw their grain. In the Red River Valley, for instance, grain is hauled in bulk in wagon boxes with high sides. The wagon is driven under shelter upon a balanced platform. The platform tilts on a pivot, lowering the rear end of the wagon; the tail board of the wagon box is opened, and the wheat or other grain slides out and down into a pit. Tin cups or buckets running on an endless belt, driven usually by a gasoline engine, scoop up the grain and carry it aloft into any one of many bins. These receiving elevators stand usually on a spur track for the accommodation of freight cars. Grain is loaded into the cars, running by its own weight through spouts.

State laws authorize the erection of elevators along suitable sidetracks, and require railways to provide proper car service. Large grain buyers erect a series of elevators, one at a station, for the entire length of a railway system. Competing buyers put up competing lines of elevators. Not infrequently grain raisers combine to build a farmers' elevator to handle and sell their own grain and save the middleman's profit. A town of 1,000 people may have a dozen elevators. Altogether they loom conspicuously against the horizon. They are the skyscrapers of the prairie town.

Mammoth elevators are built at terminal points. An elevator with a storage capacity of 1,000,000 bushels excites no remark. Ordinarily a terminal elevator handles but one article, as wheat, oats, barley, corn, timothy seed, clover, flax, etc. There are facilities for fanning and for sifting and for drying and for mixing. Certain elevators, as those at Kasota, Minnesota, make a specialty of sending wheat in showers through a blast of sulphur vapor, this, not only to destroy smut, but to bleach the kernels and impart a bright, marketable color. Ninety cars a day may be treated.

The American elevator originated at Buffalo, New York,—a meeting place of lake, railway, and canal transportation. The work of transferring grain in bags was not only laborious, but it was slow and expensive. The building of elevators is a business in itself. They must be able to withstand enormous bursting pressure. When lumber was less expensive the outer walls of the large elevators were built of heavy plank laid flat and spiked down, one on the other, to a height of perhaps a hundred feet. The whole was covered oftentimes with iron sheeting to keep out rain and ward off sparks from passing locomotives. The walls were tied together by partitions and long iron rods. The increasing cost of wooden construction and immense losses from fire have led to the use of concrete, reinforced by steel bars. With a change of material has come a change of shape also. The rectangular form has given way to the circular, tower-like structures.

Elgar, Sir Edward William (1857-), a distinguished English composer who in 1904 was uniquely honored by an "Elgar Festival," held at Covent Garden, London. He was born at Broadheath, Worcestershire, England, and was privately educated. In 1882 Sir Edward was appointed conductor of the Worcester Instrumental Society, and in 1885 organist at St. George Catholic Church, Worcester. Resigning both these positions in 1889, he has since

devoted himself exclusively to composition. Important among his works are *The Black Knight; Lux Christi*, produced at the Worcester Festival of 1896; *Te Deum; Caractus,* produced at the Leeds Festival of 1898; *Variations; Sea-Pictures; Dream of Gerontius,* generally considered his masterpiece; *The Apostles; The Crown of India,* and *The Music Makers.*

Elgin, a city in Kane County, Illinois, thirty-six miles northwest of Chicago, located on both sides of the Fox River. Its extensive watch-works have made it known everywhere; in them are employed 3,000 persons, and over 1,800 watches are manufactured daily. The city has also a large dairy business, carriage and shoe factories, packing-houses, cotton mills, manufactories of farming implements, soap, etc. Located here are a Catholic seminary, a state hospital for the insane, a large library, and other important buildings. In 1920 its population was 27,454.

Elgin (ĕl′jĭn) **Marbles,** a collection of sculpture originally adorning the Parthenon at Athens. While ambassador at Constantinople from 1799 to 1802, Thomas Bruce, the seventh earl of Elgin, obtained permission from the Turkish government to take any stones from Athens "that might appear interesting to him." Athens, it must be remembered, was at this date a tumble-down city sheltering a village of wretched peasants and herdsmen. Lord Elgin expended a fortune of about $350,000 in making excavations, and in removing and transporting to England the treasures of Phidias, the great sculptor. He secured in this way the greater part of the frieze and the relics of two gable ends of the Parthenon as well as a number of statues and capitals. The English government returned him about half the sum. These remains of ancient art, known as the Elgin Marbles, are now placed in the Elgin room of the British Museum. Some of them are much chipped and injured; others are nearly perfect. One frieze, composed, of course, of many separate slabs, is about 175 yards long. The Elgin Marbles are regarded as the choicest specimens of ancient art in existence. Could it have been foreseen that Athens would so soon become the capital of an independent country, without doubt Lord Elgin would have refrained from helping himself to these treasures. It may be said in defense, however, that they were preserved in this way from the partial destruction which overtook the Parthenon during the subsequent war for Grecian independence. They have been accessible to the scholars of the world, and have been well cared for. It is just possible that, as facilities for traveling increase and the desire of mankind rises to see them in their original position, they may be restored at some future time to the Parthenon. See PARTHENON; AEGINETAN MARBLES; SCULPTURE.

Elijah, a great Hebrew prophet, whose story is one of the most interesting of Old Testament narratives. The name Elijah means *Whose God is Jehovah.* About 929 B. C., in the reign of Ahab, this prophet appears suddenly upon the scene, burning with zeal for what he believes to be his mission, the winning back to God of the Israelites, who, through the influence of Ahab's wife Jezebel, have become idolaters. Elijah's faith in God is boundless—he stops at no obstacle. Prophesying a famine, which ensues, he leaves Ahab, and is himself fed by ravens at a brookside and later by the widow of Zarephath, whose handful of "meal wasted not, neither did the cruse of oil fail" while the prophet remained with her. Elijah raises the widow's son from death, and the three years of famine being completed, returns to Ahab. Finding that the monarch is still pursuing his wicked course despite God's displeasure evidenced by the famine, Elijah conceives the idea of proving before the eyes of all that the Lord is more powerful than the heathen Baal. He challenges the prophets of Baal to demonstrate the power of their god. The four hundred and fifty heathen priests build their altars, prepare their sacrifices and cry aloud from morning until evening for fire to consume their offerings, but no fire appears, neither is there voice, nor any answer. At evening Elijah has his sacrifice wet until the water runs around the altar and fills a trench "as great as would contain two measures

of seed"; he prays, "Let it be known this day Thou art God in Israel," then the "fire of the Lord fell, and consumed the burnt sacrifice, and the wood, and the stones, and the dust, and licked up the water that was in the trench." The people fall upon their faces to acknowledge that "the Lord, He is God," and Baal's prophets are slain. Then, for the drouth is not yet over, Elijah prays for rain and the rain comes.

Evidently the prophet believed at this point that his mission was accomplished, for when Jezebel, learning that the prophets of Baal had been slain, threatened him with death, he was seemingly overwhelmed and fled into the wilderness praying that he might die. He had lost faith, not in God, but in himself, and in his mission. "I am not better than my fathers," he exclaimed. But instead of death, food appeared and Elijah ate and slept. There followed a most impressive spiritual experience. As he stood on Mount Horeb a "strong wind rent the mountains," but Elijah felt that "the Lord was not in the wind; and after the wind an earthquake, but the Lord was not in the earthquake; and after the earthquake a fire, but the Lord was not in the fire; and after the fire a still, small voice." Then Elijah "wrapped his face in his mantle" for he knew it was the Lord. The voice spake no word of comfort or of censure, only a command for the next duty. But it is evident that Elijah learned from it that God's revelations are spiritual and not material, and that the prophet has but to obey. There is no further evidence of discouragement or doubt on Elijah's part. He obeys the commands of the "still, small voice," and at last after anointing Elisha and training him as his successor, is taken up "by a whirlwind into heaven."

Eliot, Charles William (1834-), a president of Harvard College. He was a native of Boston. He was graduated at Harvard in 1853. He remained in the college as a tutor in mathematics. In 1858 he was made assistant professor of mathematics and chemistry. The years 1863-5 he spent in European universities. In 1865 he was elected professor of analytical chemistry in the Massachusetts Institute of Technology. In 1869 he was elected president of Harvard, a position he held until 1908. President Eliot's administration of Harvard was marked by intelligence and liberality. Among the innovations made were the removal of Latin and Greek from the list of required studies, the emphasis of modern languages, the expansion of laboratory methods, and a wide choice in the selection of subjects in all years of the college course.

In 1909 President Taft offered Dr. Eliot the position of ambassador to the Court of St. James (London), but he declined on the score that his private means would not enable him to maintain the dignity of the office fittingly, as the rent of a house deemed suitable is more than the salary of an ambassador.

President Eliot was a forceful writer on educational topics. Among the earlier articles to arrest attention were the *New Education* in *Atlantic Monthly* for 1869; *Wise and Unwise Economy in Schools, Atlantic Monthly,* 1875; *The Elective System in Our Continent,* 1882; *What is a Liberal Education? Century,* 1884. A number of his best educational papers were published in a volume bearing the title of *Educational Reform.*

The attitude of President Eliot toward college and school may be seen in the following passage chosen from the epoch-making Report of the Committee of Ten made in 1893. This committee was appointed by the National Educational Association, President Eliot, chairman. It is understood that the words are those of the chairman:

> The secondary schools of the United States, taken as a whole, do not exist for the purpose of preparing boys and girls for colleges. Only an insignificant percentage of the graduates of these schools go to colleges or scientific schools. Their main function is to prepare for the duties of life that small proportion of all the children of the country—a proportion small in numbers, but very important to the welfare of the nation—who show themselves able to profit by an education prolonged to the eighteenth year, and whose parents are able to support them while they remain so long at school. . . . A secondary-school programme intended for national use must therefore be made for those children whose education is not to be pursued beyond the

high school. The preparation of a few pupils for college or scientific school should in the ordinary secondary school be the incidental, and not the principal, object. At the same time, it is obviously desirable that the colleges and scientific schools should be accessible to all boys and girls who have completed creditably the secondary-school course. . . . In order that any successful graduate of a good secondary school should be free to present himself at the gates of the college or scientific school of his choice, it is necessary that the colleges and scientific schools of the country should accept for admission to appropriate courses of their instruction the attainments of any youth who has passed creditably through a good secondary-school course, no matter to what group of subjects he may have mainly devoted himself in the secondary school.

King Log has made room for King Stork. Mr. Eliot makes the corporation meet twice a month instead of once. He comes to the meeting of every faculty, ours among the rest, and keeps us up to eleven and twelve o'clock at night discussing new arrangements. He shows an extraordinary knowledge of all that relates to every department of the university, and presides with an aplomb, a quiet, imperturbable, serious good-humor, that it is impossible not to admire. We are, some of us, disposed to think him a little too much in a hurry with some of his innovations, and take care to let the corporation know it. "How is it, I should like to ask," said one of our number the other day, "that this faculty has gone on for eighty years managing its own affairs and doing it well—for the medical school is the most flourishing department connected with the college—how is it that we have been going on so well in the same orderly path for eighty years, and now, within three or four months, it is proposed to change all our modes of carrying on the school? It seems very extraordinary, and I should like to know how it happens." "I can answer Dr. ———'s question very easily," said the bland, grave young man: "There is a new president."—Oliver Wendell Holmes to John Morley, April 3, 1870.

Eliot, George. See CROSS, MRS. MARY ANN EVANS.

Eliot, John (1604-1690), the apostle to the Indians of North America. He was educated at the University of Cambridge, England. He emigrated to Massachusetts Bay with the family of Rev. Thomas Hooker. He became interested in the Massachusetts Indians and set himself at work to learn their language, residing, for the purpose, among them. He wrote a catechism for their use, the first book ever published in an Indian language. No copy of it exists. He translated the Bible into the Indian language. It was printed at Cambridge, Massachusetts. It was the first Bible printed in America. Eliot's Bible, as it is now called, is a rare book and fetches almost any price. Writer and readers have passed away. It is said that no one now living can read more than the title page. Eliot was a man of simple habits and unassuming manners. He lived to the age of eighty-six. John Eliot, a grandson of the former, was the pastor of Killingworth, Connecticut. He wrote a collection of essays upon *Field Industry,* the first volume of agricultural writing published in America. See PURITANS.

Elissa. See DIDO.

Elixir, e-lĭks'er, in alchemy, a solid substance believed to have the property of changing the common metals into silver or gold. We read of two elixirs. The great elixir was also called the red tincture and the philosopher's stone. A little of it shaken into a quantity of melted silver, lead, or other base metal was reputed to turn the entire mass into gold. A belief in this philosopher's stone was at one time very general, but no writer appears to have been familiar with its exact appearance. A minute dose was supposed also to prolong life and restore youth. In this connection, it was called the elixir of life. Elixir is still used in pharmacy, though tincture has largely taken its place.

Elisha, a Hebrew prophet whose deeds form an interesting story in the Old Testament. He was the son of Shaphat and lived at Abel-meholah. Many miracles are ascribed to him, such as cures and even the raising of the dead. He was a prophet for 65 years, from the reign of Ahab to that of Joash. While not so original and forceful as his master, Elijah, he had more political influence. He was anointed by Elijah and trained by him as his successor.

Elizabeth (1533-1603), queen of England. She was born at Greenwich September 7, 1533, and died at Richmond March 24, 1603. Her father was the much-married Henry VIII; her mother, Anne Boleyn, was his second wife. Elizabeth was well taught, chiefly by the celebrated Roger Ascham. She was an apt student of Latin and Greek.

Henry's successor, Edward VI, maintained the Episcopal church. At the death of Edward, however, Mary, known in Protestant annals as Bloody Mary, reëstablished the Roman Catholic religion. Her advisers brought many Protestant leaders to the block, and authorized persecutions, even burning at the stake, on account of religious belief. Elizabeth was a Protestant at heart, but she supported Mary's accession to the throne. She saved herself much annoyance, and possibly saved her life, by apparent conformity to the religious views of her sister.

Elizabeth no sooner ascended the throne, however, an event which occurred in 1558, than she took immediate measures to restore the Church of England to its former position of authority. The Episcopal organization and form of worship established in her reign have continued practically without change to the present time. Nevertheless, the queen was far from tolerant. Her affections were rooted in the Episcopal church, of which, as sovereign, she was the supreme head. The Catholics were, of course, very much dissatisfied because the authority of the pope had been denied. At the other extreme were many people who were equally dissatisfied because the Church of England did not, in their opinion, go far enough. Many of them had resided abroad under the influence of Calvin, Luther, and other reformers. They regarded the Church of England as entirely too papistical. They desired a "purer form of worship," and became known as Puritans. Elizabeth disliked Catholics and Puritans. She persecuted both, and both of these religious bodies hated her most cordially. As a matter of state policy she favored the Huguenots in France and the Protestant party in the Netherlands. She became the recognized head of European Protestantism.

Her foreign policy was strong. It was her good fortune to have for prime minister and confidential adviser William Cecil, afterward Lord Burleigh, who had served under Edward VI. The exploits of Sir Philip Sydney, Sir Francis Drake, Captain John Hawkins, Sir Walter Raleigh, and Admiral Lord Howard, and the destruction of the Spanish Armada belong to this period. England became the leading maritime power of the world.

During Elizabeth's reign the British East India Company commenced operations, and the foundation of the British empire in the New World was laid. The first English colony in America was founded on Roanoke Island by Sir Walter Raleigh, one of Elizabeth's courtiers. Virginia was named in honor of Elizabeth, the Virgin Queen. Owing to the large number of eminent writers, her reign is known as the Elizabethan Period of English Literature. William Shakespeare, Edmund Spenser, and Francis Bacon are the great names of this period.

Elizabeth was a woman of ability and undoubted patriotism. She was ambitious and fond of power. Though considered cold-hearted, she had many suitors. A desire to rule uncontrolled is given as the most probable reason for not marrying. Although arbitrary by nature, she had the good judgment to be guided by the wishes of Parliament. She was a handsome, vain woman, untruthful, far from staunch and loyal to her friends, arbitrary and even despotic in her little court circle; but she had the strength of character to avoid licentiousness and to work for the good of her people. Many oppressive laws were repealed, many obnoxious monopolies were abolished. During her reign a great improvement took place in the condition of the common people. Schools and colleges were encouraged. Manufactures were built up; the people were relieved from burdensome taxes; comfortable houses took the place of hovels; floors of dirt and beds of straw became less common. Her treatment of the unfortunate Mary, Queen of Scots, is described elsewhere. On the whole she deserves the popular name accorded her of "Good Queen Bess." The following tribute from Shakespeare's play of *King Henry VIII* is not undeserved:

She shall be loved and feared: her own shall bless her;
Her foes shake like a field of beaten corn,
And hang their heads with sorrow; good grows with her.
In her days every man shall eat in safety

ELIZABETH SIGNING THE DEATH WARRANT OF MARY, QUEEN OF SCOTS
From the Painting by J. Schrader

Under his own vine what he plants; and sing
The merry songs of peace to all his neighbors.

The dress worn at Elizabeth's court was peculiar in many respects. It was very showy, being much trimmed with silk, embroidery, and jewels. The broad Elizabethan ruff, worn by both men and women, was a conspicuous feature of the dress of the times. Men wore short breeches and padded stockings. Their coats were often slashed, and were made of brilliant colors. The hats were tall and were adorned with great plumes. Rich velvet capes were also worn. The fashions of the women were equally extravagant. Enormous hoops for extending the skirts and long pointed bodices were much worn. Elizabeth herself is said to have had 3,000 dresses. In spite of her strength as a sovereign, Elizabeth had many feminine weaknesses. She affected the dress and manners of a coquette to the day of her death, and expected her attendants to heap flattery upon her. They compared her to Venus and Diana in fulsome language that would be offensive at the present day. A German who visited her court when she was sixty-five years of age is quoted by the *Britannica* as follows:

She appeared stately and majestic; her face oblong, fair, but wrinkled; her eyes small, yet black and pleasant; her nose a little hooked, her lips narrow, her teeth black, her hands slender and her fingers long (there was a special beauty in her delicate white hands, and in her audiences she took care not to hide them). She had pearls with rich drops in her ears, wore false red hair, had a small crown on her head, her bosom uncovered, her dress white silk, bordered with pearls of the size of beans, a collar of gold and jewels; and thus arrayed, Elizabeth passed along, smiling graciously on the spectators, who fell down on their knees as she approached; while a marchioness bore up her train, a bevy of ladies followed her dressed in white, and she was guarded on each side by fifty gentlemen pensioners carrying gilt battle-axes.

See RALEIGH; MARY, QUEEN OF SCOTS; BACON; SHAKESPEARE; VIRGINIA; ARMADA.

Elizabeth (1709-1762), empress of Russia. She was the daughter of Peter the Great and Catharine. From her father, she inherited ability; from her mother, beauty. She ascended the throne of Russia December 17, 1741, having first, by means of a conspiracy, removed her brother Ivan VI. She was an unprincipled and licentious woman. She was influenced by favorites and governed the country through them. The slightest objection to her measures or to her friends was followed by imprisonment or by exile for life to the mines of Siberia. The redeeming quality in her life was her patronage of literature. She furnished Voltaire with the materials for his life of Peter the Great. She also founded the University of Moscow and the Academy of Fine Arts at St. Petersburg. In the case of men like Alexander, Peter, and Napoleon, the historian permits their talents to cover their vices and accords the title of the Great. In the case of a woman, however, vices are never forgotten. The name of Elizabeth is prominent in Russian history, but the art of writers has never been employed to shield her from the reputation of infamy.

Elizabeth, Saint (1207-1231), of Hungary, sometimes called Elizabeth of Thuringia. She was born in Presburg, the daughter of the king. When only four years old she was betrothed to Louis IV, landgrave of Thuringia, whom she married at fourteen. From her early childhood she disliked the pomp and glitter of the court, delighting herself with the study of religion and with acts of charity. Her husband was influenced by her noble character and helped her in the kind deeds with which her days were filled. After his death in 1227 she was driven penniless from the throne by her brother-in-law, and lived with her three children in actual want until the throne was restored to her son by her barons. She spent the rest of her life in seclusion, however, doing severe penances and helping the sick, even those with the most loathsome diseases. Four years after her death she was canonized by Gregory IX.

Elizabeth, originally Elizabethtown, New Jersey, was settled by the English in 1665, and until 1790 was the capital of the state as well as the original seat of Princeton College. It is located on Staten Island Sound, and connected with Elizabethport on the island by a drawbridge 800 feet long. Its shipping, largely coal

and iron, is carried on through Elizabethport. The Singer sewing-machine factories are located here, as are also manufactories of pottery, paints, machinery, leather and rubber goods, artificial stone and cars. Its unusual facilities for commerce have led to its being called "The Railroad Harbor City." Several railroad lines enter the city. It has an old-time atmosphere, and many places of historical interest. The streets are well paved and are lined with magnificent old shade trees, and altogether the town presents a delightful appearance. There are many fine modern residences here occupied by New York business men. Elizabeth has parks, a public library, an orphan asylum, several hospitals and some fine residences, both in colonial and modern architecture. Population, 95,783.

Elizabeth City, N. C., a port of entry and the county seat of Pasquotank Co. It is situated on the Pasquotank River, 145 miles northeast of Raleigh. The Norfolk & Southern and the Virginia & Carolina Coast railroads enter. It is situated in an extensive agricultural region, and in the city are manufactured bricks, carriage and wagons, boxes, baskets, barrels, hosiery and flour. Elizabeth City is the commercial center for fifteen or more counties in northeastern North Carolina and for three or four counties in southeastern Virginia. It is a shipping point for large quantities of shad and herring caught in Albermarle Sound. A United States custom house is located here. Besides good graded schools there is a State Normal school. The population was 8,925 in 1920.

Elk, a genus of the deer family. The American elk or wapiti is really a large deer,—the largest and finest deer in North America. It is chestnut in summer and grayish in winter. It corresponds in the west to the caribou in the east. It is a stately animal nearly as large as the moose. It attains a live weight of 1,000 pounds. The antlers attain a spread of thirty to fifty inches. It has small, shapely legs, and hoofs fitted for hard ground. Like the deer it sheds its antlers annually. Its original range corresponded with that of the buffalo. It was once found from Virginia to Wisconsin and westward, but it is now nearly extinct. Possibly 20,000 still find shelter in and about the Yellowstone National Park. In the winter season they migrate southward to graze in the valleys of Jackson's Hole. There are small herds in the Olympia Mountains of Washington, in Oregon, California, Colorado, Montana, Idaho, and Manitoba. Fortunately, elk do well in parks. A herd of sixty-two has been set free in the Adirondacks. Mr. W. C. Whitney built up a large herd near Lenox, Massachusetts. Twenty or more American cities have herds in their parks. The real American elk are the moose and the caribou—flat-antlered animals. The remains of a huge elk have been found in the peat bogs of Ireland. The tips of its enormous antlers are eleven feet apart. The elk has been a favorite prey of hunters, so much so that the species was threatened with extinction. Now game laws are in force in both the United States and Canada for the protection of these animals. See DEER.

Elkhart, Indiana, a city in Elkhart County, 101 miles east by south of Chicago, at the junction of the St. Joseph and Elkhart rivers, and on the Lake Shore & Michigan Southern, the St. Joseph Valley, the Chicago, South Bend & Northern Indiana, and the Cleveland, Cincinnati, Chicago & St. Louis railroads. A large dam erected at a cost of $750,000 furnishes power for the town's industries, which include automobile factories, railroad shops, musical instrument factories, and bridge and iron works. Other manufactures are corsets, furniture, rubber goods, paper boxes, brass sundries and telephone supplies. Elkhart has a Carnegie library, several large office buildings, some modern residences and an adequate public school system. Population, 24,277.

Elks, Benevolent and Protective Order of, a fraternal organization formed by members of the theatrical profession in New York City in 1868. Men in other occupations are now admitted to membership. A primary purpose is the social pleasure of its members. The organization makes contributions for charitable and benevolent purposes. It has no insurance feature. The letters E. L. K. are repeated

in the titles of some of the officers, as Esteemed Leading Knight, Esteemed Loyal Knight, etc. The by-laws of the order permit only one lodge in a city. On Elks' Memorial Day, the first Sunday in December, the order paraphrases with appropriate public ceremonies the Masonic Lodge of Sorrow, in memory of deceased members. The official organ of the Elks is the *Elks-Antler*. In 1922 there were 1,459 lodges with an enrollment of 812,657. The largest lodge has over 10,000 members.

Elliott, Charles Loring (1812-1868), an American painter of portraits, was born at Auburn, N. Y., and studied art in New York City with Trumbull and Quidor. He executed commissions for portraits in the state of New York for many years, finally settling in New York City. He was considered one of the best portrait painters of his day, his work being true to life, drawn with sure strong strokes, his color being one of his chief merits. He has been criticized somewhat as lacking in imagination. Be that as it may, among his sitters were James Fenimore Cooper, Fitz-Greene Halleck, Fletcher Harper, A. B. Durand, and Governor Bouck (the latter's portrait being in the City Hall, New York).

Elliott, Maxine (1871-), an American actress, owner and manager since 1908 of Maxine Elliott's Theatre, New York City. She was born at Rockland, Maine, but removed to New York while still a girl, determined to make her way on the stage. In 1890 she appeared with E. S. Willard in *The Middleman*. In 1894 Miss Elliott was engaged as leading lady by Rose Coghlan, and played with her in *Diplomacy, Forget Me Not,* and *London Assurance*. She went to London with Augustin Daly's company. In 1896 she joined the company of Nat C. Goodwin, whose wife she became but from whom she was later divorced. She co-starred with Mr. Goodwin in a number of plays, including *Two Gentlemen of Verona, Midsummer Night's Dream,* and *Twelfth Night*. In 1903 she sarred in *Her Great Match* and *Her Own Way*. Miss Elliott has appeared at her own theatre in the star roles of *The Chaperon, Deborah of Tods,* and other plays.

Ellipse. See CONE.

Ellis Island, an island in New York Bay. It has been used by the national authorities since 1890 as a receiving station for immigrants. Castle Garden, the old landing station, became too straitened for the thorough medical examination which was found necessary, so a new building with adequate facilities for handling a crowd was erected on Ellis Island, a mile out in the bay. The buildings are extensive, and, indeed, there is need of space, for the annual influx of immigrants that at present passes through the guarded doors of Ellis Island is equal to the population of Boston, Cambridge, and Lynn combined. Enough unskilled laborers come in yearly to duplicate the population of Cleveland or Cincinnati.

The work of the station officials is systematic. The ship is first examined by a quarantine officer. If pronounced free from contagion the ship comes into harbor. The first class passengers go ashore by means of a steam barge and get their effects through the custom house. The steerage passengers, each provided with a numbered manifest of source, finance, and destination, get their baggage and children together with incredible din, and in evident fear of losing something. They are guided down a wide gangway and are conveyed by a barge to the broad steps of Ellis Island. The real ordeal begins here. The throng surges slowly forward. Guides able to speak the languages, push, pull, and shout directions. Lynx-eyed surgeons and detectives, each at his post, size up the immigrants as they pass in line, and chalk their clothing with a letter. A central hall of great dimensions is divided by railings into lettered compartments. Attendants guide the newcomers into these compartments. "Compartment F" is filling up with able-bodied Italians. Perhaps they have a leader. As soon as the count is complete—possibly one or more may have been sent to a detention compartment for stricter medical inspection,—this lot is conducted to a barge and sent on *via* the Pennsylvania Central to dig an irrigation canal in the Far West. These women, struggling up the stairway with bundles on

their backs, bundles in their hands, children clinging to their skirts, and health tickets held in their teeth, are duly inspected and chalked and bunched in "Compartment K." Before nightfall they will be on their way to join their Finnish husbands, who have sent back wages earned in the iron mines of Minnesota. Two days and they will be the center of an excited Finnish mining colony, everybody talking at once; a week and they will be housekeepers in wooden shacks, and the children will be in school, on the way to become Americans.

But all do not get away from Ellis Island. "S. I." on the lapel of a lame man sends him to a board of special inquiry. He may be a cripple whom "friends" have sent to America to escape the expense of supporting him. "L. P. C." means an inquiry lest the bearer be liable to become a public charge, in which case the steamship company is required to take him back to the old country again.

One stairway leads up from the steamer landing to the great floor. Three stairways known as the "Stairs of Separation" lead down another way. One of these leads to the barge which conveys immigrants to the Battery and to the freedom of New York City. A second leads to a barge that conveys passengers to the great railway stations for transportation farther on. A third leads to a waiting room where impatient friends may be in waiting. Pathetic reunions take place and heart-breaking separations are of daily occurrence. Brothers and sisters go their several ways on the "Stairs of Separation," never to meet again. Families leave behind them the feeble and aged, whom they cannot take farther because they cannot show that they are able to support them. Lovers, looking forward to a home in the New World, may be separated; for the strong may enter, but those afflicted with certain contagion must go back.

Now and then a criminal is arrested or barred. A matron scans the women closely. The officials are described as kindly, but firm. Europeans find it cheap riddance to pay the passage of paupers and the infirm. Our shores must not be made a dumping ground for European distress. The work of inspection is necessarily rapid and keen, for a thousand immigrants is not a large day's work. As high as 11,000 have landed in a single day. Those who can show a fair bill of health and an ability to care for themselves are given a bag of food and are sent on promptly to their destination. Others receive a special hearing; they are allowed to send for friends; and, if error there be, it is likely to be made on the side of leniency.

See ALIEN; IMMIGRATION.

Elm, a fine spreading tree, belonging to the same family as the nettle, the hop, and the mulberry. There are four elms in the eastern part of the United States. The wahoo elm, a small tree with winged corky branches, Ohio Valley and southward; the rock elm, of which Oliver Wendell Holmes' parson built his wonderful one-hoss shay; the slippery elm held in fond memory for its delight-yielding inner bark; and the famous American or white elm, the finest shade tree on the continent. The trunk not infrequently attains a girth of sixteen feet. Volumes might be written on the types and individuality of the American elm. It is at once hardy, long-lived, and graceful. The native home of this elm is the rich soil along woodland rivers, but it withstands the trampling of village streets. New England is noted for its elm-lined streets. New Haven is sometimes called the City of Elms. The elm in Cambridge under which Washington took command of the Continental army is called the Washington Elm. Lowell called a volume of his poems, *Under the Elms*. The flowers have no petals. They come in early spring before the leaves. The fruit of the elm is a flat, circular seed, winged all around with a thin, brown membrane. The ripe fruit flies in the wind like chaff. The leaves are strongly straight-veined. They are short-petioled and are oblique or unequally heart-shaped at the base.

Elman, Mischa (1892-), a distinguished Russian violinist. He was born at Talnoje, Russia, and at an early age showed such remarkable talent that his father took him to Odessa at the age of six.

Here he studied under Fidelmann for four years. In 1902 Leopold Auer prevailed upon the Czar to suspend the rule barring pupils of Jewish faith from the Imperial Conservatory of St. Petersburg. Mr. Elman studied at the Conservatory for two years. In 1904 he made his debut in St. Petersburg, and was acclaimed as a great artist. This success has been repeated wherever the violinist has gone. He made his American debut in 1908, and has successfully toured America six times since then.

El Paso, Texas, the county seat of El Paso County, is a rapidly growing city located on the Rio Grande River, about 645 miles west of Dallas. It is reached by several of the important railway lines, having direct connection with the Pacific and Gulf Coasts and the capital of Mexico. The city is finely located, occupying a high elevation and for this reason enjoys a mean annual temperature of about 63° F. Extensive deposits of salt as well as other minerals, are found near by. The city is the center of a large trade in cattle but also contains smelting works, cigar factories and other industries. A United States Military Post is located here. In addition to the public schools, the city contains St. Joseph's Academy, a School of Mines and a Theological Seminary. The population of the city has more than doubled during the past decade, being, in 1900, 15,906 and in 1920, 83,836.

Elwood, Ind., is located on Duck Creek, 50 miles northeast of Indianapolis. It is served by two railroads, and is the shipping center for grain, poultry and live stock raised in the vicinity. It is in the natural gas belt of Indiana, and its numerous factories produce tin-plate, bricks, lumber, windows, shovels, plate-glass and lamp chimneys. The city contains a public library and modern graded schools. The population in 1920 was 10,790.

Ely, Richard Theodore (1854-), an American economist. He was born at Ripley, New York and his education was pursued at Columbia University and at Heidelberg. For ten years from 1881 he was professor at Johns Hopkins, and from 1892 at the University of Wisconsin. He has written several books on economic subjects, among them, *French and German Socialism in Modern Times, Socialism and Social Reform, Social Aspects of Christianity, The Distribution of Wealth, Problems of Today,* and a text-book, *Elements of Economics.*

Elyria, Ohio, the county seat of Lorain County, is situated 8 miles from Lake Erie. It is served by the New York Central and the Baltimore & Ohio Railroads. The most important of the city's numerous manufactures are automobiles, home-lighting plants, paints, phonographs, switchboards, strip steel, angle iron, iron pipes, saddles and metal polish. It contains a public library, graded schools and a fine natural park. The water works are owned by the city. Population 1920, 20,474.

Elysium, ē-lĭz'ium, or **The Elysian Fields,** in Greek mythology, the abode of the souls of heroes. It is a region in the far west where there is neither snow nor storm, heat nor cold. Gentle zephyrs and balmy breezes blow continually, and healing odors are spread abroad. Hesiod describes these Islands of the Blessed as located in the far Atlantic. The climate is so mild and propitious that the soil yields three crops a year, a description not inappropriate to the Bermudas. The words Elysium and Elysian are in common use in literature. Elysium is often used as synonymous with heaven, or to designate any delightful abode: Elysian to describe something superlatively pleasant, as a state or abode of delight.

Who, as they sung, would take the prison'd soul,
And lap it in Elysium. —Milton.

There is no death! what seems so is transition;
This life of mortal breath
Is but a suburb of the life Elysian,
Whose portal we call Death. —Longfellow.

Elzevir, a celebrated family of Dutch printers of the seveneteenth century. The founder of the family reputation was Louis Elzevir, who established himself as a bookbinder and bookseller in Leyden. A copy of the Eutropius, a Latin author, appeared in 1592. It is regarded as the earliest Elzevir. In all he published about 150 works, chiefly in Latin. His five sons continued the business. The most noted El-

zevirs, as their editions are called, are of small size, 12mo., 16mo., or 24mo. In point of neatness, clearness, excellence of type, and beauty of paper, it is considered that the Elzevirs have not been surpassed, even by the choicest specimens of modern printing. The last printer of the name died at Leyden, 1712. The total number of Elzevirs is 1213, of which 968 are in Latin, 44 in Greek, 126 in French, 32 in Flemish, 22 in various eastern languages, 11 in German, and 10 in Italian. Although none are in English, these editions are much sought by booksellers. The cover designs are considered highly artistic. See BOOK.

Emancipation, Proclamation of, in American history, a state document setting free all slaves of such states and parts of states as were in rebellion against the authority of the national government. It was made January 1, 1863. It was issued by President Lincoln as a military measure, acting in his capacity as commander-in-chief of the army and navy. It set free all slaves in Arkansas, Texas, Louisiana (except certain parishes including the city of New Orleans), Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, and Virginia,—West Virginia and certain counties excepted. The slaves were enjoined to "labor faithfully for reasonable wages wherever they were permitted to do so." It was written New Year's morning by President Lincoln in his own hand. The penmanship is firm and neat. The signature is scraggly. The president explained that he was not particularly agitated when he signed, but that a stream of New York callers had come in ere he completed the task, and that his grasp of the pen had become tremulous through excessive handshaking. The official proclamation was, of course, drawn up at the State Department. The original copy on four sheets of foolscap was presented to the managers of a fair held in Chicago for the benefit of the soldiers. It sold for $3,000. It was destroyed in the great Chicago fire. Fortunately photographic copies are in existence. The memorable pen, a steel affair in a plain colored cedar handle—the two together not worth to exceed six cents—passed into the hands of a citizen of Boston. See NEGRO; LINCOLN.

Embalming, ĕm-bäm′ĭng, the art of preparing dead bodies to prevent their decay. It was practiced in Egypt as early as 4000 B. C. A special class of low grade priests or physicians was employed. They embalmed not only human bodies, but cats, crocodiles, the ibis, ichneumon, and other sacred animals. It cost a talent of silver, or over $1,000, to embalm the body of a person of rank. The interior of the body was filled with myrrh, cassia and other preservative materials. The body was then steeped for seventy days in natron or carbonate of sodium found in the lakes of the Libyan Desert and Upper Egypt. It was then wrapped in linen bands, well waxed, and was deposited in an artistically constructed wooden coffin or sarcophagus. Joseph, it may be remembered, ordered his servants to embalm his father, Jacob. So well was embalming done, that it has been possible during the last century to photograph the shrunken faces of the ancient pharaohs, whose mummies, as the prepared bodies are called, were discovered in the royal burial places of Egypt. After the lapse of from 3,000 to 4,000 years, the palm of the hand and the sole of the foot are still flexible and soft to the touch. A number of American museums possess well preserved Egyptian mummies and sarcophagi. A mummy found in a sandstone grave on the west bank of the Nile, and now preserved in the British Museum, is considered the oldest body known. Flint knives show that the burial took place in the stone age.

Less expensive methods were employed to preserve the bodies of the poor. In brief they were salted and dried. The custom ceased about 700 A. D. One author estimates that not less than 700,000,000 Egyptian mummies were disposed in the caverns and cliff burial places of the Egyptians. The exceedingly dry climate had much to do with the success of the preservation of these mummies. Much of the spice and embalming material was brought from the eastern countries by caravan, and naturally was regarded as very precious.

Various embalming materials were used by different nations. The Assyrians used honey. The body of Alexander the Great was embalmed in wax and honey. Other materials were the pitch of the cedar tree, asphalt, salt, gypsum, and saltpeter. Embalming has been employed successfully in England also. The body of King Canute, laid away in Winchester Cathedral in 1036, was found in a good state of preservation in 1776. The body of William the Conqueror and his wife Mathilda were still recognizable at Caen five centuries after their burial. In modern times the art of embalming is practiced by undertakers chiefly to preserve bodies for a limited period of time. Zinc chloride, arsenic, and mercuric chloride are among the agents employed. As they are rank poisons, great care is necessary in their use. Embalming materials one and all are merely germicides—anti-bacterial agents.

Many tribes of American Indians elevate the bodies of their dead upon scaffolds, and endeavor to preserve them as long as possible by a process of drying.

See Pyramids.

Embargo, in international law, an order issued by a government forbidding ships to leave or enter port. The embargo is seldom resorted to save in war time. When ships belonging to a foreign country are under an embargo, the embargo is called "hostile"; when the ships belong to the state issuing the embargo, it is "pacific." The Hague Convention has laid it down that ships in an enemy port at the time of a declaration of war must be given time to leave.

Embezzlement, in law, the appropriation for one's own use of funds or goods held in trust for another. Thus embezzlement is unlike larceny, and consists in the violation of confidence; but if the user of another's funds believes himself authorized to do so, he does not commit embezzlement. It is usually from associations whereby, through the nature of one person's employment, the funds or goods of another person or persons come into his possession that the crime results. The crime is punishable in all states and provinces, usually by a term of imprisonment.

Embla. See Aske.

Embossing, in the manufacture of textiles, the process of producing raised figures on the surface of textiles, leather, etc. Heated metal rollers are engraved with patterns. The cloth is passed under the roller several times, the heat and pressure producing upon the velvet or other material the figure cut upon the metal.

Embroidery, the art of working ornamental designs with the needle upon any fabric. The designs appear as if raised, and may be worked out in silk, cotton, wool, or other yarns. The name comes from an Anglo-Saxon word meaning edge or border, probably from the fact the embroidery was used chiefly to finish and adorn the edges of church vestments. The art is of great antiquity. A thread of silk, cotton, gold, or silver was used to ornament cloth and leather, especially the borders of hangings, royal garments, and articles used in religious ceremonies. Homer speaks of the embroiderer's art. The Hebrews learned to embroider in Egypt. The garments of Aaron, the high priest, were embroidered. The hem of his robe bore pomegranates of blue, purple, and scarlet. The Laplander still embroiders the reindeer skin used for leggings. The North American Indian embroidered his moccasins elaborately with threads of sinew and strips of gayly colored porcupine quills. The famous Bayeux tapestry was a sort of embroidery worked with the needle and worsted on a wide canvas. The border of the Cashmere shawl is practically the same thing. The art of embroidery attained high perfection among the ancient Greeks, whose work has affected all its subsequent developments.

From the ninth to the fifteenth century needlework flourished throughout Europe, especially in France and England.

About 1828 Joseph Heilman of Alsace invented an embroidering machine, an improved form of which is used to produce most of the white embroidery on the market at the present time. The first machine-made embroidery shipped to the United States was consigned to a New York house by S. Hamel of Hamburg, Germany. Although a Swiss product, Hamel called the embroidery Hamburg, presumably that his

own city might have the credit of its manufacture. As a result Swiss embroideries were known for many years in the United States as Hamburgs.

The embroidery machine is simple. A width of muslin or other material four and one-half yards long, is stretched in an upright position in the center of the machine, each end held firmly by hooks. The needles, from 150 to 300 in number, are arranged in a straight row in a sort of frame. The needles point toward the cloth and extend from end to end of it. The needle used has its eye in the middle instead of the end. Each needle carries a thread held in the eye by a peculiar knot. The frame moves forward causing the needles to pierce the cloth simultaneously. Thus corresponding stitches are set at the same time in all sections of the pattern through the four and one-half yard strip of cloth. When one row of embroidery is complete, the cloth is raised and a second row made. This machine is controlled by hand. A machine operated by power is used to some extent for certain kinds of embroidery. Its use is increasing.

The Bonnaz embroidering machine is designed for another variety of work. This is quite similar to an ordinary sewing machine, but the needle, instead of being stationary, is movable, so that it is made to follow the outlines of the pattern, and the material does not have to be turned around. This is used for fancy stitches on lace curtains and other large articles. The machine is a "single thread" and produces a chain stitch. Industrially, there are two classes of embroidery. First, white embroidery on various grades of cotton and linen cloth. This is produced usually by machinery. In the production of this class of work Switzerland still stands first, then France, Germany, and Scotland. The second class includes embroideries done in silks, gold threads, and silver threads. This work is done by hand. The oriental nations excel in this class of embroidery, China taking the lead in elaborate specimens, with Japan standing second. The skilled workers of these countries embroider both sides of the material exactly alike. Elaborate pictures of great size and in brilliant colors are used by them as wall decorations. In these countries embroidery forms the principal decoration for dress of both men and women.

Emerald, a precious stone. It is of a peculiar green color. It is found in the form usually of a short, six-sided crystal. It is rather a soft stone, being little harder than quartz. It is a variety of beryl, with a trace of chromium. When heated, the emerald turns blue, but resumes its natural color again when cool. If heated too far, however, it melts into a white, clouded mass of no value whatever. The emeralds of the ancients were obtained from Ethiopia and Upper Egypt. They were greatly prized, both on account of their rich color and the ease with which they could be carved into desired figures. The finest emeralds of modern times have been obtained from Peru, Colombia, and the Urals. The largest emerald known is that in the Royal Museum at St. Petersburg. It was obtained in the Ural Mountains and weighs over six pounds. A magnificent emerald gem is kept with the crown jewels in the treasure chamber of the imperial palace at Vienna. In the language of precious gems, the emerald represents success in love. Ireland is called the Emerald Isle because it is usually clothed with beautifully green vegetation.

Emerson, Ralph Waldo (1803-1882), an eminent American essayist, lecturer, and poet. He was born at Boston May 25, 1803, and died at Concord April 27, 1882. His father was a Unitarian clergyman. Young Emerson was educated at Harvard, receiving his degree in 1821. He taught school for a few years, studied theology, and entered upon an assistant pastorate in his native city. In 1832 he resigned this position on the score of unwillingness to administer the sacrament of the Lord's Supper. He was also opposed to the practice of prayer in public, yet throughout his entire life he was a constant attendant at church. Emerson was married twice. The death of his first wife placed him in possession of a property with an income of $1,200 a year. On this amount he settled comfortably at Concord, Massachusetts. He was a man of simple habits. He passed

his life in reading, meditating, traveling, lecturing, and writing articles. Between thirty and forty years were spent in this way.

Although Emerson shrank from prominence and from participation in public affairs, he was a keen observer. He took a deep interest in the Brook Farm experiment, yet remained in his own quiet home. He was also interested deeply in the question of abolishing human slavery. He appears, however, to have remained calm, trusting to the general trend of events rather than to agitation. For this reason, he was never reckoned among the abolitionists. When the Civil War broke out he was a supporter of the Union cause, yet it is safe to say that one of his gentle habits would never have been willing to take the responsibility of bringing on the war. Few men have done more to stimulate and help on reforms, but he was not himself a man of action.

Educators find sound doctrine in his essays. He teaches that desired reforms and changes of opinion may be brought about best by beginning with the children in school. He mentions repeatedly the advantages of teaching children gardening, a knowledge of plants and animals, and of the use of tools,—thus foreshadowing the modern call for manual training and the elements of agriculture. As might be expected, he was an earnest supporter of art and literature in the schools.

Emerson was a poet of no mean order. In the first place he had a delicate ear. He brought together a volume of the most exquisite poetry in the English language, which was issued by his publisher under the name of *Parnassus*. A good sized volume is required also to contain his own poems. Of these, *Each and All, The Rhodora,* and *The Humble Bee* would certainly deserve a place in a volume of the world's best poems. *The Fable,* or the quarrel between the mountain and the squirrel, is a little gem for the schoolroom. *The Snowstorm* is one of the most exquisite bits of snow poetry in our language.

One of the pleasantest episodes in the life of Emerson is his friendship for Carlyle. During a visit to Scotland he called on Carlyle while the latter was living at a lonely home in the country, writing the first of the essays that made him famous. From this time on the two men exchanged letters with regularity. Emerson was influential in calling attention to Carlyle's writings, and Carlyle recognized Emerson as one of the great men of the century. The Carlyle-Emerson correspondence fills two respectable volumes.

Emerson's lectures and magazine articles were published in a number of volumes. The first, called *Nature,* was published in 1836. Other volumes are *Essays, Representative Men, English Traits, Conduct of Life, Society and Solitude,* and *Letters and Social Aims.*

Emerson has a peculiar style, or want of style. His essays show a wide range of reading and much sound, original thought; but they are very different from anything else produced on this continent. Narrative or story-telling is condensed to the merest mention. Apt allusions are frequent, and show that he had an observing eye and a reflective mind, but description is entirely wanting. His essays are almost without plan. It is said that as he wrought in his garden, walked in the woods, read in his library, or lay awake in bed, he was in the habit of jotting down good thoughts as they occurred to him. When in need of something to say he distributed his loose pieces of paper all over the floor and furniture of his study, and went down on his knees, groping around among them to bring together a sufficient number to make up an essay or lecture. Whether this be true literally or not, it is evident that the thoughts of even his best essays are strung together without very much regard to the order in which they occur. If the various paragraphs were separated, it would be difficult, if not impossible, to restore them to their present position. Nevertheless, few writers have left so many sentences worthy of passing into popular sayings. Benjamin Franklin is the only other American who exceeds him in this respect. The greater popularity of Franklin's saying is due to the fact that they seem to come from the field and the shop, rather than from the library. Emerson's sentences

have done more to stimulate the thought of the writer, the clergyman, and teacher than those of any other literary man of his century. Mr. Sanborn affirms that the nearest approach that any American has made to the universality of Shakespeare's mind is found in the wide reach and easy elevation of Emerson.

The following are a few of his sayings:

America means opportunity.
All are needed by each one.
He builded better than he knew.
Thoughts rule the world.
Man in the bush with God may meet.
Beauty is its own excuse for being.
Put your creed into your deed.
Discontent is the want of self reliance.
There is always time enough for courtesy.
Proverbs are the sanctuary of the intuitions.
A great man is always willing to be little.
Manners are the happy way of doing things.
Thought is the property of him who can entertain it.

Nothing great was ever achieved without enthusiasm.

A friend may well be reckoned the masterpiece of Nature.

The hearing ear is always found close to the speaking tongue.

We do not count a man's years until he has nothing else to count.

Next to the originator of a good sentence is the first quoter of it.

If the single man plant himself indomitably on his instincts, and there abide, the huge world will come round to him.

If you put a chain around the neck of a slave, the other end fastens itself around your own.

No man ever prayed heartily without learning something.

See CONCORD; THOREAU.

Emery, a fine grained, black sandstone. Its color is due to the presence of iron. In use it may be cut into the shape of a grindstone and caused to rotate on an axis; but it is so difficult to work that it is really easier to pound the stone into a powder and build it up into the required shape again with cement. Rubber and copper are frequently added to the composition to diminish danger from breaking. The emery paper on sale at hardware stores consists of paper coated with glue and dusted with emery powder. Its principal use is in smoothing metal and wood. Emery cloth is prepared in the same way. It is used chiefly for polishing metals. Emery is found in Massachusetts, Georgia, and North Carolina; but the world's chief supply is obtained from Asia Minor and the Grecian Archipelago. Emery ranks next to the diamond in hardness. It will cut glass or any other material save the diamond. See CORUNDUM; ALUMINUM; SAPPHIRE.

Emigration, a movement of population out of a country, due usually to labor conditions. Such a movement usually occurs to a country or to countries less thickly populated and offering a better chance to make a living than the emigrants' own, though people may be driven from home by political or religious persecution, as were the Puritans. Some people leave, of course, for personal reasons, perhaps to join their relatives or to study. Since 1850 great hordes of emigrants from Europe, of late years chiefly from the southern countries, have poured into the United States. They have been very much needed to build railroads, cut down forests and otherwise to promote our great commercial enterprises, but they have created many problems as to how they shall be treated for their own best good and that of the country. See IMMIGRATION.

Emin′ Pasha′, or **Emin Bey** (1840-1892), a Prussian surgeon known as an African explorer and governor. His real name was Eduard Schnitzer. In 1865 he was appointed surgeon of the Turkish army. He acquired the Turkish and Arabic languages readily and in addition many customs and habits. He adopted the name Emin which means "faithful one." He entered the Egyptian service in 1876 and was made surgeon-general of the Egyptian army in the Sudan. Two years later General Gordon appointed him governor of the equatorial province where he made various explorations. The insurrection of the dervishes under the Mahdi in 1883 shut Emin away from the civilized world, although he retained his position. In 1887 he was made pasha or governor by the Egyptian government,—thus the word pasha, added commonly to the designation of Emin. An expedition under Stanley reached Emin Pasha in 1888 but he refused to leave his people. In 1889 he was

deposed and imprisoned and after his release left the country. Soon after he went on an exploring expedition into East Africa for the German East Africa Company. He was killed by Arabs during this expedition. See GORDON; MAHDI; STANLEY.

Eminent Domain, the power of the state to take private property for public use upon making a just payment to the owner. The right is exercised much less freely, of course, than other powers of a government, but there are times when public welfare and even public safety depend upon the use by the government of some private property. This is especially true in time of war, though the right is exercised oftener to obtain land for public buildings, franchises for government ownership, etc. The condemning of lots upon which to construct state university buildings is an example of its use.

Emmanuel Movement. See CHRISTIAN SCIENCE.

Emmet, Robert (1778-1803), an eminent Irish patriot. He was born in Dublin. His father, for whom he was named, was a physician. Young Robert attended Trinity College, Dublin. He was a prominent member of the so-called Historical Society, and was an ardent champion of the independence of Ireland. He resented English rule. It became the wish of his life that Ireland should follow the example of the American colonies and set up a republic. In 1798 he was expelled from college for membership in a secret association known as the United Irishmen. He then traveled on the continent, but returned secretly in 1802 and took part in the organization of an Irish revolution. July 23, 1803, Emmet and his associates made an attempt to surprise the arsenal and the castle of Dublin, but his followers were timid and the effort resulted in little more than a riot. Emmet fled to the interior to the Wicklow Mountains, and might have escaped from Ireland, but that he visited Dublin for a last interview with a Miss Curran, to whom he was engaged. This visit proved his undoing. He was arrested, tried on the charge of high treason, and on September 20, 1803, executed in Saint Thomas Street, Dublin.

Thomas Moore, the Irish poet, was a schoolfellow of Robert Emmet, a fellow student at Trinity College, and a warm personal friend. One of the most pathetic of his Irish melodies, "O, breathe not his name," was written to commemorate Emmet's sad fate. Miss Curran left Dublin and died in Sicily soon after. Moore made her the subject of another melody, "She is far from the land where her young hero sleeps."

Although rash and impracticable, Emmet was a young man of irreproachable character. Even his enemies had nothing to say against his private life. When asked by his judges what he had to say in his own defense, Emmet defended himself in a speech of remarkable clearness, but without avail. When asked why the sentence of death should not be pronounced upon him, he spoke most eloquently, closing with the following paragraph:

> I have but one request to ask at my departure from this world—it is the charity of silence. Let no man write my epitaph; for, as no one who knows my motives dares now vindicate them, let no prejudice or ignorance asperse them. Let them and me repose in obscurity and peace, and my tomb remain uninscribed, until other times and other men can do justice to my character. When my country shall take her place among the nations of the earth, then—and not till then—let my epitaph be written.

Emotion. See FEELING.

Emperor, the title of the ruler of a confederation of states, that is, an empire, was derived from the Latin "imperator," general, and was first used by Julius Caesar in 58 B. C., to mark his position at the head of the Roman Empire. Roman rulers continued to use the title until the fifth century; and it was conferred upon Charlemagne as head of the Holy Roman Empire in 800. Immediately before the Empire came to an end Francis II in 1804 declared himself the hereditary emperor of Austria. In the latter part of the nineteenth century the king of Prussia became the emperor of Germany. In 1721 the title had been adopted by Peter the Great of Russia. Since the World War only two sovereigns remain who bears the title, and these, the emperor of Japan and the King of England as emperor of India, are benevolent rulers.

Empire Day, May 24, originated with Mrs. Clementina Fissenden, of Hamilton, Ontario, Canada. It is a day set apart in all parts of the British Empire to celebrate the glory of England and foster patriotism in school children. It is usually observed in the schools of the Empire, with lessons and exercises appropriate to the occasion. The observation is in many places varied with drills, exercises and a salutation to the flag held in the open air and participated in by the general public.

Originating in Canada, the "Empire movement," as it is called, soon spread to all corners of the Empire, and was enthusiastically received. Its object is hardly expressed in the single word patriotism, for it teaches love of knowledge, forgetfulness of self, citizenship, devotion to duty, and thoughtfulness for the poor and the afflictde. For this day the motto is: One King, One Flag, One Fleet, One Empire; its watchwords are "Responsibility, Self Reliance, Sympathy, Duty."

Employer's Liability, the liability of employers for injuries to, and, in some cases, diseases contracted by, their employees while actually engaged in work. The time was when one man in undertaking to work for another for pay tacitly agreed to take upon himself the risks of the occupation, even to dangers resulting from negligence on the part of his fellow workers. With the introduction into industry of complicated high speed machinery, however, it was seen that the risks were too numerous and too serious for the worker to assume, while leaving the employer free, and that the common law interpretation of their relations was in need of modification.

In 1880 the British Parliament enacted the first known law intended to extend the liability of employers beyond the common law interpretation. Since that time, laws have been enacted in all industrial countries making it compulsory for an employer to insure in a state fund or in a mutual or stock company, or to give full proof of ability to compensate such of his employees as may be disabled while in his employ. A development of the legislation under consideration is the "Workmen's Compensation Law," which provides that compensation due as the result of injuries received or disease contracted is made automatically. The liability laws, are, unless backed by compensation laws, defective, since they place upon the injured worker the necessity of proving that the fault lies with the employer—frequently a difficult thing to do.

Emporia, Kans., situated on the Neosho River 60 miles southwest of Topeka, is the county seat of Lyon County. It is served by the Missouri, Kansas & Texas, the Atchison, Topeka & Santa Fe, and other railroads. Emporia is the shipping center for a prosperous stock-raising and agricultural region. It contains corrugated metal works, foundries, flour mills, marble works and ice and cold-storage plants. Here are located the College of Emporia, Emporia Business College, a State Normal School, the Emporia School of Music and Art, and a Carnegie library. Emporia is the home of William Allen White, journalist, and author of several volumes of short stories and other works of fiction. The population was 11,273 in 1920.

Ems, emz, a famous watering place in western Prussia. It is situated in the valley of the Lahn, twelve miles from Coblenz. The valley is here inclosed by rocky cliffs crowned with woods and vineyards. Old coins, weapons, and other relics found here indicate that it was at one time a Roman post. There are lead and silver mines here, but the town owes its fame to its mineral springs. The waters are warm, ranging in temperature from 70° to 130° F. They are strongly impregnated with carbonic acid gas, and afford relief in cases of chronic catarrh and lung troubles. The city is given over largely to hotels and other accommodations for summer visitors. From 10,000 to 15,000 patients and tourists visit the city each summer. While here for his health in the summer of 1870, King William III, afterward Emperor William I of Germany, was approached by the ambassador of Napoleon III. The Frenchman took advantage of the old king in a casual meeting in a garden, and goaded him unhandsomely, practically giving notice that brought on the Franco-Prussian War of 1871.

Emu, ē′mū, a large three-toed bird pe-

culiar to the Australian region. It is intermediate in size between the cassowary and the ostrich, to both of which it is related. Its body is draped with an abundance of sooty brown, hair-like feathers of a peculiar structure. The wings are short, and so hidden in the plumage that they are scarcely noticeable. The feathers are worthless for decoration. The flesh is not eaten save by the natives. The emu is a bird of the plains. It lives on grass, fruit, and roots. The nest is scooped in the sand. Eggs, six or seven, green, five inches long. On the score that the emu interfered with sheep-raising, emu hunts were popular. Like many other interesting Australian animals, the emu is approaching extinction. It is found only in the far interior. Fortunately for ornithology the emu does well in captivity. The Duke of Bedford maintains a flock in Woburn Park, England. Good park specimens may be had for about $125. See OSTRICH; CASSOWARY.

Enameling, the art or process of applying (1) a glaze or vitrified substance, either transparent or opaque, to pottery or porcelain of many kinds, as a coating; (2) a coating of similar character on iron utensils for cooking, etc., called enamelware; (3) a decorative coating of glass or other vitreous substance, variously colored, on a surface of metal or porcelain; and (4) a glossy coating of varnish or lacquer on any smooth surface, such as leather, paper, slate, etc. In anatomy, the enamel of a tooth is its hardest part—a very dense, smooth, glistening substance which crowns the tooth or coats a part of its surface, as distinguished from dentine and cement. In cosmestics, enameling is the art of applying a coating to the skin, to give the appearance of a beautiful complexion. Cloisonné is a special kind of decorative enamel-work in which partitions surrounding the compartments of enamel of each different color are formed of wire of rectangular section, secured to the body or foundation of the article decorated. Surface enamel is any kind in which the whole surface of a plate of metal is covered with the glaze or vitrified substance, which when fused forms a smooth ground for painting. A familiar example of surface enameling is the dial of a common watch, which is enameled on copper in white, the figures being painted on it in black enamel. In champlevé enameling, most used for jewelry and similar decorative work, the surface of the background is engraved or hollowed out to receive the enamel.

Canton enamel is a variety of surface enamel in which the ground is usually plain white, yellow or light blue, and is decorated with enamel paintings in which are many colors, representing conventional flowers, scrolls, etc. Vases, incense-burners and similar articles are made of it, and it is one of the most successful of modern Chinese industries. Limoges enamel is another kind of surface enamel produced especially at Limoges in France, in which vessels and decorative pieces of various sizes are ornamented with pictorial subjects painted in many colors and in gold. This work reached its highest excellence at the time of the Renaissance.

The art of enameling is of remote origin. It was applied to pottery by the Chinese in very early times, and was practised also by the ancient Egyptians and Etruscans, passing in the course of time to the Greeks and Romans. The enameling of metals, which in modern times is the subject of a considerable industry, appears to have been invented in western Asia and to have been introduced into Europe in the early centuries of the Christian era. Enamels are now used on many metal surfaces exposed to the weather, such as advertising and street-name signs, as well as for bath-tubs, numerous domestic utensils, and vessels or containers employed in the chemical industry. The main purpose of industrial enameling is to protect the surface to which enamel is applied from rust or the action of corrosive substances.

ENAMELED WARE. Formerly enameled metalware was usually rather thick and clumsy, but enamel is now successfully applied to sheet iron and sheet steel. The utensils are pressed out of the sheet metal, and the metal foundation having been properly prepared by annealing to stand a high degree of heat, it is dipped in a melted glaze, or kind of liquid glass, colored as desired by means of metallic oxides. The

articles are then fired in an oven similar to that used for the glazing of pottery, which is kept at a temperature of about 1,500° Fahr. The exact ingredients of the glaze are trade secrets which are carefully guarded in the factories making enamel-ware. Pure white enamel is said to be less tough than gray. An ordinary enamel is prepared from common glass fused with lead oxide and rendered opaque by the addition of the oxide of tin. Several successive coats of enamel are sometimes applied to domestic utensils, and the quality depends on both the quality of the glaze and the number of coats applied. In the cheaper grades of enamel-ware arsenic is substituted for the oxide of tin in making the glaze; and it is said that this lessens the cost by about 75 per cent. A mottled variety is called by the trade name of agate-ware.

Late in the nineteenth century there was a revival of the art of decorative enameling, and artists now have at their command purer metals, better colors, and improved apparatus for applying heat; but the older specimens of enamel art remain unsurpassed.

Endicott, John (1588-1665), a Colonial governor of Massachusetts, one of the six adventurers of Dorchester, and the man who with his courageous band of about 100 founded Salem in 1628. He was born at Dorchester, and when the Puritans were ready to leave for America to found a new home, the zealous Endicott eagerly joined them. He was harsh and bigoted, but as Governor of the Colony of Massachusetts he served faithfully. His energy and ability won the esteem of most of his associates. Endicott is generally credited with the founding of the Colonial Mint in 1652. In 1658, after having served several terms as Deputy-General and Governor, he was elected President of the United Colonies of New England.

Endive, a composite plant, a native of Asia. It was cultivated in Egypt at an early period, was in use by the Greeks and Romans, and was introduced into Great Britain before 1548. It has long been cultivated as a garden vegetable in both Europe and the United States. There are two leading varieties, one with narrow curled leaves, the other having broad, ragged leaves. Since the leaves are bitter, they are put through a process of blanching by lightly tying the outer leaves together, after which they are ready for the table in the form of salads and stews. The varieties that are most curled are more in favor, since they begin to blanch before being tied.

Endymion, ĕn-dĭm′i-on, in Greek legend, a beautiful young shepherd who fed his flocks on Mount Latmus. According to one of the many stories about him, he had asked Zeus for immortal youth. Zeus granted his prayer, but, with the gift, condemned him to perpetual sleep. So the beautiful youth slept forever upon the mountain. Selene, goddess of the moon, looked down one clear night and saw Endymion asleep. His beauty charmed her and she came nearer. Stepping

> As from a golden car
> Out of the low-hung moon,

she kissed the beautiful sleeper, and then watched over him that no harm might befall him through the night. The story of Endymion has always appealed strongly to poet and artist. A statue of Parian marble called *The Sleeping Endymion* was found in Hadrian's villa at Tivoli, and is now in the National Swedish Museum.

Energy, one of the two fundamental concepts of physical science, the other being matter. It is defined in physics as the capacity for doing work. The relationship between energy and work is very intimate, no work being possible without energy being expended and no energy stored up unless work has been done upon the body.

Energy is of two kinds: potential when the position of a body is such as to make work possible; and kinetic, when the body is capable of doing work as a result of its motion. If a ball be thrown vertically upward, work is done in giving it the impulse which causes it to rise against the force of gravity. The kinetic energy, due to its motion, is a gradually diminishing one as the velocity falls off, till the extreme height is reached, when the kinetic energy becomes zero. As the body rises it gains

in potential energy, or energy of position, till at its highest point this energy is a maximum. It is interesting to note that there is an exact theoretical equivalence between kinetic energy at the bottom and the potential energy at the top and that at any point in the path the sum of the energies is equal to that same number. This change of energy in a simple case such as this illustrates one of the fundamental laws of physical science known as the conservation of energy. Briefly stated this is that the total amount of energy in any body may be neither increased nor diminished without outside influence, but that it may be transformed without absolute loss into any of the forms of energy to which it is susceptible. This law is of universal application, as is also the fundamental law of conservation of matter. The kinetic energy of the sun's heat in past ages caused the conditions which gave rise to the vast forests which were later overwhelmed and became the coal beds. The potential energy of the chemical separation of the carbon from oxygen lies dormant in the coal till upon burning in the steam engine it becomes heat or molecular kinetic energy. Then if the steam engine runs a dynamo, we get electrical energy which in turn may become heat and light.

Although the total energy of the solar system does not increase nor diminish, as stated in the law of conservation of energy, it is becoming less and less available. In all the transformations, some energy is dissipated in heat and is irrecoverable. So it is an incontrovertible fact that the available energy of the solar system is running to waste, and we must view with equanimity the time when the earth and all the planets shall no longer circle round the glowing sun but all together in one dead mass shall hang lifeless in the everlasting night of space. See WORK; ERG.

Engine. See LOCOMOTIVE; STEAM ENGINE.

Engineering, the science and art of planning, constructing, and managing works and structures of various kinds, including engines or other machines; or the art of executing civil or military works which require a special knowledge or use of machinery, or of the principles of mechanics. Engineering at the present day may be broadly defined as the practical application of science and scientific methods to industry. Its four principal branches, each constituting a distinct profession, are civil engineering, mechanical enginering, electrical engineering and mining engineering, each having several sub-divisions which are the subject of separate study. The functions of the various branches of the science may be described briefly as follows:

1. CIVIL ENGINEERING, that branch of engineering which relates to the construction or care of roads, bridges, railways, canals, aqueducts, harbors, drainage systems and other kinds of fixed public works. Civil engineering includes structural engineering, sanitary engineering, hydraulic engineering, railway engineering, bridge engineering, etc.

2. MECHANICAL ENGINEERING, the branch of science that relates to the invention, contrivance, and adjustment of all kinds of machinery, the properties of materials, control of engines and motors, etc.; also called dynamic engineering. It includes such specialties as automobile engineering, steam engineering, gas engineering, heating and ventilating engineering, etc.

3. ELECTRICAL ENGINEERING, the branch which deals with the design, construction, and application of all classes of electrical machinery and apparatus.

4. MINING ENGINEERING, the branch of science which includes all the work in connection with exploration for, and the development and mining of, ores, coal and minerals generally. It embraces a knowledge of the various minerals and metals found in the earth, and of all the operations involved in selecting, testing, opening and working mines.

OTHER BRANCHES. Besides the above branches or divisions of engineering science, it would be easy to list many specialties in engineering work which are well recognized, and the list is constantly increasing as new industries arise with special technical features that are systematized as subdivisions of engineering. Military engineering, and naval or marine engineering, however may be mentioned as in

a class by themselves. Military engineering is that branch which deals with the construction and maintenance of fortifications, and all buildings necessary in military posts, and includes a thorough knowledge of every point relative to the attack and defense of places. It also includes the surveying of a country or territory for the operations of war. Marine engineering is the branch which relates to the construction and management of engines for the propulsion of steamships and other machinery employed on shipboard.

ENGINEERS. The name "engineer" is applied in the United States, not only to those engaged in practicing any of the various branches of the engineering profession, but also to the operators of steam locomotives, stationary steam-engines and marine engines. The latter may be distinguished as locomotive engineers, stationary engineers, etc., while the professional men are called civil engineers, mechanical engineers, electrical engineers, mining engineers, etc. An example of the dinstinction may be seen in the use of the terms "mining engineer" and "mine engineer"; the former being classed as a professional man and the latter as a mechanic. The engineering profession itself does not define with any authority what constitutes an engineer, and there is no legal restriction upon the practice of engineering in the United States, although in recent years there has been considerable agitation among the engineering societies for restrictive legislation.

ORGANIZATIONS. The four great American societies of engineers have a membership approximately as follows: Civil Engineers, 10,500; mechanical engineers, 17,000; electrical engineers, 14,500; mining engineers, 5,000; or a total of 47,000 members. Admission to these societies and kindred organizations, such as the Society of Automotive Engineers, is generally conditional upon the attainment of a fair degree of professional standing and experience. When we include the great number of men engaged in professional engineering work in subordinate capacities, such as draftsmen, instrument men, inspectors, etc., it will be seen that engineering employs a vast body of skilled men, many times larger than the membership of the societies mentioned. There are as a matter of fact about 300 other societies of engineers in the United States besides the great national societies.

HISTORY. Engineering is one of the oldest professions in history. Civil engineering dates from the ancient art of land surveying, and down to the present day surveying has been an important part of the engineer's work. Military engineering became an early necessity of warfare, when siege was laid to a fortified stronghold, and the direction of tunnels to reach a desired point had to be fixed by an engineer. The engineering works of antiquity are both numerous and prominent, many of them remaining while all other traces of their constructors have passed away. The most notable of the works belonging to very remote antiquity are the harbors of the Phoenicians, the palaces and sewerage system of Nimrud, and the pyramids of Egypt. Next in order come the harbors of ancient Greece, the bridge of boats across the Dardanelles built by Xerxes, the Persian king, to transport his immense army into Europe, and his canal across the isthmus of the peninsula of Mount Athos. The building of ancient Rome next claim attention, including its theaters, temples, baths, and aqueducts, some of which carried water from distances of more than fifty miles into Rome, while its roads, bridges, and drainage works compare in extent and magnificence with the most celebrated works of modern times. From that period down to the commencement of the eighteenth century, the most extensive engineering works executed were the canals, embankments, and other hydraulic constructions used by the Dutch for the purposes of inland navigation and to protect the lowlands of Holland from the encroachment of the sea; the canals of north Italy, and the cathedrals and fortifications of medieval Europe.

Civil engineering, as a distinct profession, may be said to have originated in England about the middle of the eighteenth century. Mechanical engineering attained importance with the improvements in the steam engine by James Watt, and its subsequent application to the railway system by George Stephenson. This development,

with the use of steam in navigation, gave a great impetus to commerce and civilization, which in their turn created the necessity for the numerous and magnificent engineering works of modern times; such as the innumerable railways, highways, and canals that intersect all civilized countries; the bridges, waterworks, docks, harbors and vessels that facilitate commerce, and the telegraph cable and telephone systems that increase our comfort and prosperity. The development of electrical power and its application to industrial purposes has extended the scope of the engineering profession and increased its importance in the economic and industrial system of the world.

Railway building has been an important branch of engineering for the last hundred years. The services of engineers are required to locate railway lines and the structures along their route; to arrange the grade and provide for excavations and embankments; to build bridges and tunnels where necessary; to provide suitable motive power and rolling stock, and facilities for their maintenance and repair; and to maintain the road in proper condition for continuous and efficient service. Railway engineering is more than an art of construction; in modern practice, it demands the application of skilled judgment and experience to the solution of the highest economic and financial, as well as constructive, problems, and is indeed "the art of making a dollar earn the most interest." This may be said with equal force of all the other branches of engineering that are applied to the problems of industry.

In recent years great engineering firms, have sprung up that undertake the construction of public works of the greatest magnitude and importance. These firms are contractors as well as specialists in the various branches of engineering. Schools of engineering are found at all the important universities, with courses largely based on mathematics, physics, and chemistry, which are the foundation of all branches of engineering. This fact enables engineers to change readily from one branch of engineering to another at times, and the profession contains many engineers who do not specialize at all, but act as technical advisers or executives and direct the work of civil, mechanical, mining and electrical engineers in carrying out great works of construction or conducting large manufacturing and mining industries.

England, ĭng′gland, the southern part of the island of Great Britain. Its general outline is triangular. If we exclude Wales, the area of England is about 50,216 square miles. With the exception of the Welsh and Scottish frontiers, the entire border is a seacoast, cut by bays and estuaries, forming the best harborage in the world. The western border is on the whole, rough. A mountainous region extends from the Cheviot Hills southward to the plateau of Dartmoor. The peaks seldom rise, however, above 3,000 feet. The largest body of inland water in England is Lake Windermere, in the so-called lake region of Westmoreland County. It, however, covers an area of less than three square miles. The western shore is for the most part of hard rock. The eastern and southern coasts consist of limestone and chalk cliffs. The waves are eating away portions of the coast of Yorkshire and Kent at the rate of four or five feet a year, amounting to a mile in four centuries. Of the Dover and eastern coast it may be said: "The materials which fall from the wasting cliff are sorted by the tide; the whole shore is in motion; every cliff is hastening to its fall; the parishes are contracted, the churches wasted away."

Climate. England lies within the influence of the Gulf Stream. This ocean current brings with it winds of very nearly the same temperature the year around. The summers of England are prevented from becoming hot; the winters are never very cold. All parts of the country have abundant rain. An annual rainfall of fifteen inches may be regarded as a minimum. There are localities where the total rainfall for the year is over 100 inches. In consequence, the rivers are very large in proportion to their length. The Thames, the Humber, the Severn, and the Mersey are the principal streams. Nearly all empty into estuaries of the ocean, which, by the aid of high tides, enable ships to ascend for a considerable distance. Newcastle, Hull, London, Southampton, Plym-

outh, Bristol, and Liverpool are all situated on tidal rivers of this sort at or near the head of navigation.

AGRICULTURE. The soil of England is exceedingly rich. Grasses grow luxuriantly. The country is clothed almost the year around with a carpet of living green. Although the climate is too cool to permit the raising of Indian corn, England is one of the finest stock-raising countries in the world. Our domestic animals are descended chiefly from those of England. The Berkshire, the Essex, and the ancestors of the Chester-white hogs; the Devon, the Hereford, the Durham, and the Shorthorn cattle; the black-faced Shropshire, the long-wooled Cotswold, the Lincoln, the Leicester, the Cheviot, and the Southdown breeds of sheep are all from England. Aside from melons, Indian corn, and tropical productions, almost every field crop, vegetable, and fruit produced in the United States is raised in England. The chief field crops are wheat, barley, oats, beans, peas, potatoes, and turnips. Peas are an important fodder crop. Turnips take the place largely of corn.

MINERALS. The mineral wealth is very great. The ancient navigators of Tyre visited the shores of Britain for the sake of obtaining tin. Enormous measures of coal underlie a large part of the country. Iron ore of excellent quality is found in abundance. Lead, copper, and zinc are obtained also. Sandstone, slate, limestone, and granite are the chief building stones. There are large beds of excellent potter's clay.

POPULATION. The natural productions of England are so varied and abundant, the soil is so fertile, and the climate so healthful, that it is safe to say no other portion of the globe is better adapted to maintain a dense population in comfort. The number of inhabitants at the beginning of the twentieth century amounted to over 32,000,000. With London, the largest city in the world, at the head of the list, there are thirty towns having a population of over 100,000 people each. Birmingham leads in the manufacture of steel; Manchester, in cotton; Bradford, in woolens; and Leeds, in linen.

Productive as the country is, however, it would be impossible to maintain this enormous population without outside help. The area of England is somewhat less than that of Alabama. The population exceeds by a third that of our Atlantic States from Maine to Florida inclusive. The average population is 440 to the square mile,—far more than the land can employ or feed. The surplus population is employed in manufacturing and in commerce. England buys immense quantities of wool, cotton, and silk in all parts of the globe where these articles are produced.

COMMERCE. According to the *Statesman's Year Book,* England with the other countries that make up the United Kingdom, buys abroad and imports the incredible amount of 2,000,000,000 pounds of cotton and about half as much wool every year; 227,000,000 tons of coal and 13,000,000 tons of iron are mined annually. About 9,000,000 people work for wages, turning the iron, cotton, and wool into utensils, tools, machinery, cloth, and clothing. Immense quantities of wheat, corn, flour, meat, coffee, sugar, tea, rice, butter, cheese, and eggs are bought in foreign countries and brought home to supply this industrial population with food.

Nearly 2,000,000 people are engaged in commerce. The English are the great carriers of the world. In 1920 there were over 6,500 sailing vessels and 11,891 steam vessels doing business at English ports. About one-fourth of the food supply and raw materials needed is purchased in the United States; about one-seventh of the British goods sent abroad is sold in the United States.

England with the rest of the United Kingdom is what is called a free trading country. The ships of all nations are permitted to land their cargoes without paying duties. Goods shipped out of the country also go free. In order to raise money for the expenses of the government certain exceptions are made. Chicory, cocoa, coffee, dried fruits, spirits, tea, sugar, tobacco, and wine pay a duty on entering the country. One of the reasons why manufacturing is carried on to such an advantage in England is the abundant supply of cheap coal. The rate at which it

SOME ENGLISH FOLK FROM COAST AND COUNTRYSIDE

1. A Lowestoft Smacksman, Suffolk
2. A Derbyshire Yeoman
3. Devonshire Fishermen

is being mined and consumed, however, has caused a fear lest the supply be exhausted. In order to discourage the shipment of coal abroad an export duty has been placed on it.

Fisheries. The fisheries are also an important industry. Over 100,000 people are employed in them. Over half a million tons of fresh fish are landed, chiefly along the eastern coast, annually. The total catch is worth about $30,000,000 a year.

Rural England. Although land is valuable for agricultural purposes, about one acre out of twenty is covered with timber. A large part of the country is owned by the nobility and others of large income who do not feel the necessity of close tillage. Footpaths through magnificent wooded parks, through meadows, and along streams make England one of the most delightful countries in the world for excursions on foot. The roads are well kept; the hedges are neatly trimmed; the front dooryards of the peasantry are full of flowers. The villages are neat and picturesque. Comfortable inns are found everywhere. The large manufacturing towns have, of course, squalid, untidy quarters, but it is hard to imagine a country more attractive and delightfully picturesque than rural England.

Public Utilities. As might be expected in an old country, the roads are excellent. Free rural delivery is quite complete. A system of parcels post managed by the government takes the place of our express companies. Packages are carried by the mail carts at a ridiculously low price. In 1910 the postoffice department delivered 97,800,000 parcels in England and Wales. Railroads are built much more substantially than in this country. In fact, the English locomotive could not operate on our irregular road beds. The passenger cars are divided into compartments entered from the side. These compartments are furnished in different styles called first, second, and third class. A ticket for a first class compartment costs twice as much as one for a third. An overhead foot bridge is to be found at every country station. People are not allowed to cross on the tracks, even though no trains are in sight. In addition to roads and railways, the country is provided with a network of canals, having a total length of over 3,000 miles. The largest is the Manchester ship canal. It is 25 miles in length, 26 feet in depth, and 120 feet wide at the bottom.

England is known by many names. Albion, from the Latin *albus,* has reference to the whiteness of the chalk cliffs. England is held to mean angle land, though some claim that the first syllable means meadow. Oliver Goldsmith refers to England as the "land of scholars and the nurse of arms."

England, History of. Of England the beginning of the first century B. C. there is practically no record. The natives, ages before recorded history began, were the rudest kind of savages, dwelling in caves and living by hunting and fishing. At length these stone-age people were conquered by a very different race, the Celts or Britons, who came from the continent of Europe. These knew how to make weapons or bronze and how to till the soil, and they soon learned the use of iron. In those ages the Phoenicians, then the greatest traders in the world, came beating across the sea in long-oared galleys, to get tin from the Britons.

Roman Conquest. When the Romans began to extend their rule over Gaul, they were annoyed now and then because the Britons would cross the English Channel in their frail little boats and aid the Gauls. So Caesar determined to teach the Britons the power of Rome by sending Roman legions into England. With this invasion, in 55 B. C., the recorded history of England begins.

The conquest of the Britons was not really completed until the time of Agricola, and even then the northern part of the island, beyond the Firth of Forth and the Clyde, never became Romanized. The Romans built great roads and about fifty walled cities, and taught the Britons how to plant oats, barley and wheat. In a number of settlements Christianity was introduced by traders or by soldiers, and a few chapels were built. After three centuries the Romans had to withdraw their

legions from Britain to use every man in the mighty struggle with the Teutonic hordes. Left to themselves the Britons fell a prey first to the Picts and Scots, who poured down from the north, and then to the Jutes and their allies, the Angles and Saxons. These last were originally called in to help drive off the Picts and Scots, but they quickly made themselves masters of the island and made slaves of most of the Britons. It was for his resistance to these pagans that Arthur lives in legend.

Beginnings of England. The Angles and Saxons gradually partitioned the land into seven kingdoms, but about the beginning of the ninth century Egbert, king of Wessex, succeeded in making himself master of all the seven kingdoms. From this year, 827, dates the foundation of the kingdom of England. With only six exceptions, all the rulers of England during eleven centuries have been descendants of this Wessex king.

One of the chief tasks of these early kings was to fight the Danes, who were constantly struggling for a foothold in the island. Alfred, the greatest of the Saxon kings, managed to defeat the Danes several times, and kept them confined to the eastern part of his kingdom. But by the beginning of the eleventh century the Danes, reinforced by fresh hordes from the continent, had overspread England, and four Danish kings—Sweyn, Canute, Harold and Hardicanute—ruled in succession. After Hardicanute's death the throne fell to a Saxon, Edward the Confessor, who reigned until 1066. In that year Harold, chosen king to succeed Edward, was defeated at the battle of Hastings by William the Conqueror.

Medieval England. With William the Conqueror begins the period which may be described roughly by the term medieval. The Normans brought into England all the elements of the feudal system, but the later kings tried hard to strengthen the power of the crown at the expense of the feudal nobility. Under Henry II, the first of the Plantaganet kings, the barons' power began to wane, but it revived when Richard I gave all his time to crusading in the Holy Land. From John, Richard's brother, the barons forced the Magna Carta, the "foundation stone" of English liberty. During the next few years the council of the barons became a formal parliament, and a further step in the direction of constitutional government was taken in the assembling of the first House of Commons in 1265. These changes at home were partly the result of external pressure, for when the kings of England were constantly warring with Scotland, as did Edward I and II, or with France, as did all the kings from Edward III to Henry VI, they were frequently willing to yield on mooted questions at home in order to present a strong front abroad. (For details of these wars see Edward I; Edward II; Bruce, Robert; Bannockburn; Hundred Years' War.)

The Tudor Period. Henry VI, who came to the throne in 1422, was so feeble a king that other claimants to the throne arose. Out of these claims came the Wars of the Roses (which see). These had a profound effect on the country. During them, most of the powerful barons were killed, and their powers gradually absorbed by the king. The Tudors, of whom Henry VII was the first, maintained this advantage, and ruled almost as despots. Although they were despots, they were not unpopular, for they made England glorious. This was the age of exploration and discovery, when England, through the defeat of the Spanish Armada, became the mistress of the seas. The Tudor period also marks definitely the foundation of modern England in two other fields. It was during the reign of Henry VIII that the Reformation began, and the English Church was separated from the Roman Catholic. And the Tudor period, but more especially the reign of Queen Elizabeth, marked the flowering of a new spirit in literature and science.

The Stuarts and the Divine Right of Kings. Taken as a group, the Tudor rulers were despots because they were exceptionally able. When Elizabeth died the throne passed to James VI of Scotland, son of Mary, Queen of Scots, who became king of England as James 1. James was

a firm believer in his right to rule arbitrarily, as was Charles I, his son. The conflict between the kings and Parliament finally became open warfare, in which the Parliamentary armies were victorious. Charles I was executed, and for eleven years Cromwell, with the title of Lord Protector, ruled England. (See COMMONWEALTH AND PROTECTORATE.) Cromwell's son Richard, however, was too weak to maintain himself, and in 1660 the Stuart monarchy was restored under Charles II, on whom Parliament literally thrust powers which it had fought to keep from Charles I.

INTRODUCTION OF RESPONSIBLE GOVERNMENT. James II, the younger brother and successor of Charles II, was a Catholic, who endeavored in every way to supplant adherents of the Church of England in positions of power and trust by appointing Catholics. So long as it appeared that his line would die with him, Parliament and the people bore with his illegal acts as best they could; but when a son was born to him in 1688, and a Catholic succession became possible, a group of the great nobles despatched an invitation to take the throne to William of Orange, and his wife Mary, the son-in-law and daughter of James. William and Mary landed late in the year 1688, James fled to France, and the "bloodless revolution" was accomplished.

William and Mary were made joint rulers, but William was the real ruler. He gave England a wise and just government, but to the end of his days he had to endure unpopularity as a foreigner. The most important results of his rule were the freedom of worship granted to Dissenters and the acknowledgment of the principle of responsible government. Hitherto the rulers of England had chosen their ministers as they saw fit, practically as their personal agents. Responsible government meant that the ministers took their authority from Parliament, as the representatives of the people. Henceforth the ministers remained in office only so long as they had the support of the majority in the House of Commons. It was in the reign of William's successor and sister-in-law, Anne, that the legislative union of England and Scotland was at length brought about (1707). Scotland sent its members to the English Parliament, and save in local affairs ceased to have a separate government.

A new flag was adopted, the Union Jack, formed by combining the white cross of St. Andrew with the red cross of St. George. Since 1707 England and Scotland together are officially designated Great Britain.

PARLIAMENTARY GOVERNMENT AND COLONIAL EXPANSION. On the death of Queen Anne in 1715, the throne passed to George, elector of Hanover, a descendant of James I. The new king was a German, had been one all his life, and intended to remain so. He spoke no English, and took little interest in English affairs except as they might help him in his schemes on the continent. His indifference to his responsibilities as king of England was really the reason for the development of cabinet government. Sir Robert Walpole, the great Whig leader, was the first premier in fact, though he did not take that title, and he it was who first selected from his colleagues in office an advisory body, the cabinet. The reigns of the first three Georges witnessed the greatest expansion of England's colonial empire, principally as the result of wars with France. As a result of these wars (see SEVEN YEARS' WAR; FRENCH AND INDIAN WARS; NAPOLEON), England acquired vast colonies in America, established its rule in India on a firm basis, laid the foundations for its future domination of Egypt, and acquired a foothold in South Africa. The only offset to these gains was the loss of the thirteen colonies out of which arose the United States of America. (See REVOLUTIONARY WAR; UNITED STATES; HISTORY.) A governmental change of far-reaching importance during this period was the legislative union of Great Britain and Ireland, which came into force in 1801 as the result of a revolt in Ireland.

REFORM AND THE VICTORIAN ERA. It is significant of the changing conditions in British government that the reign of George IV, a king who was content with

the established order of things, should be noteworthy for the attention given to reform measures. The abolition of the death penalty for many minor offenses, the repeal of the obnoxious Test Act, and the political emancipation of the Roman Catholics deserve special mention. But it was not until after the accession of William IV that there was passed the great Reform Bill of 1832, providing for a redistribution of the franchise in accordance with population. Slavery in the British colonies was abolished in 1833.

During the long reign of Queen Victoria the reform movement continued, culminating first in the repeal of the Corn Laws in 1846, and later in the Act of 1867 which again broadened the basis of franchise and gave the workingmen a voice in government. But Victoria's reign is probably more famous for its progress along material lines. Countless inventions, such as the railroads, telegraphs and telephones, revolutionized the social and economic life of the nation. England was transformed from an agricultural community into a great mercantile and manufacturing unit. There were a few wars—the Crimean, the Sepoy Mutiny of 1857, the South African War—but taken as a whole the Victorian Era was a time of peaceful development.

THE TWENTIETH CENTURY. Queen Victoria was followed by her son, Edward VII, who will probably stand in history as the creator of the Triple Entente. During his reign the rivalry in armaments between the great European powers, and the competition for colonial empires, both contributing causes for the World War, began to be acute. At home there was a struggle over the famous Lloyd George budget of 1908, with its financial proposals then considered revolutionary. As a result of the struggle Parliament in 1911 passed an act eliminating the veto powers of the House of Lords. Not only is that body deprived of the right to amend or reject financial measures, but any measure, if passed three times by the House of Commons, becomes a law in spite of the House of Lords' disapproval.

The public excitement over these changes was only exceeded by the storm raised by the Irish question (see IRELAND; HOME RULE), which at one time threatened to cause civil war. Actual warfare was averted by the outbreak of the greatest conflict in history, in which every dependency of the empire took a gallant part. Troops from the self-governing dominions and colonies fought in line with men from Lancashire, Sussex, Middlesex, and Northunberland. The World War involved a complete reorganization of the nation to a war footing. Never before, in warfare ancient or modern, have nations so completely laid aside their peacetime characters and industries, and arranged their lives—both as individuals and as a nation—for the achievement of victory. This tremendous dislocation of national life brought with it and in its train new sets of problems for statesmen and economists. Both during the war and in the years immediately following the close the outstanding figure in England without question was David Lloyd-George. He carried probably a greater burden than any other allied leader. He faced not only the political, financial and economic problems at home and abroad, but he was in constant touch with the military leaders, and in more than one crisis made the decision. But when he resigned office in 1922 he left for his successor the problems of reconstruction.

THE RULERS OF ENGLAND

THE SAXON LINE

Egbert, King of the West Saxons, commonly called the first king of England, (A. D. 827—836.

Ethelwolf, 836—857.
Ethelred, 857—871.
Alfred the Great, 871—901.
Edward, 901—925.
Athelstan, 925—941.
Edmund, 941—948.
Edred, 948—955.
Edwy, 955—959.
Edgar the Peaceable, 959—975.
Edward II, 975—979.
Ethelred the Unready, 979—1016.
Edmund Ironsides, 1016—1017.

THE DANISH LINE

Canute the Great, 1017—1035.
Harold, 1035—1039.
Hardicanute, 1039—1041.

THE SAXON LINE RESTORED.

Edward the Confessor, 1041—1066.
Harold, 1066.

THE NORMAN LINE.

William the Conqueror, 1066—1087.
William II (Rufus), 1087—1100.
Henry I, 1100—1135.
Stephen of Blois, 1135—1154.

THE PLANTAGENETS

Henry II, 1154—1189.
Richard I, 1189—1199.
John, 1199—1216.
Henry III, 1216—1272.
Edward I, 1272—1307.
Edward II, 1307—1327.
Edward III, 1327—1377.
Richard II, 1377—1399.
Henry IV, 1399—1413.
Henry V, 1413—1422.
Henry VI, 1422—1461.
Edward IV, 1461—1483.
Edward V, 1483.
Richard III, 1483—1485.

THE TUDORS.

Henry VII, 1485—1509.
Henry VIII, 1509—1547.
Edward VI, 1547—1553.
Mary, 1553—1558.
Elizabeth, 1558—1603.

THE STUARTS.

James I, 1603—1625.
Charles I, 1625—1649.

THE COMMONWEALTH, 1649—1660.

THE STUARTS AFTER THE RESTORATION.

Charles II, 1660—1685.
James II, 1685—1688.

THE HOUSE OF NASSAU.

William III, 1688—1702.
and Mary (died 1694).

THE LAST OF THE STUARTS.

Anne, 1702—1714.

THE HOUSE OF BRUNSWICK.

George I, 1714—1727.
George II, 1727—1760.
George III, 1760—1820.
George IV, 1820—1830.
William IV, 1830—1837.
Victoria, 1837—1901.
Edward VII, 1901-1910.
George V, 1910—

STATISTICS. The following are the latest statistics to be had from trustworthy sources:

Land area, square miles	58,340
Population (estimated 1921)	37,885,242
Chief cities:	
London	7,258,623
Birmingham	861,585
Liverpool	772,665
Manchester	741,068
Sheffield	473,695
Leeds	430,834
Bristol	361,247
Bradford	282,714
Newcastle	275,009
Leicester	236,059
Number of counties	62
Members of House of Lords	708
Members of House of Commons	707
Farm area, acres	11,181,000
Potatoes, bushels	25,403,000
Oats, bushels	82,681,000
Wheat, bushels	72,664,700
Barley, buhsels	13,799,000
Hay, tons	5,339,000
Fish catch, tons	558,730
Number of public schools	21,501
Pupils enrolled	7,100,000

English Channel, an arm of the Atlantic lying between England and France. It communicates with the North Sea through the Strait of Dover, twenty-one miles wide. The channel is about 150 miles wide at the Atlantic shoulder. The English Channel has played an important part in commerce and in naval warfare.

English Language. See LANGUAGE.

English Literature. See LITERATURE.

English, Thomas Dunn (1819-1902), an American poet and novelist. He was born at Philadelphia. He was educated for a physician and afterward for the law. His novels include *Walter Woolfe, Jacob Schuyler's Millions,* and *Ambrose Fecit.* He is the author also of *American Ballads* and *Boys' Book of Battle Lyrics.* He is best known for the popular song, *Ben Bolt.*

Engraving, a method of picture making. Pictures printed from engraved plates are also called engravings. There are two distinct kinds of engravings, wood engravings and engravings on copper or steel.

The wood engraver chooses a block of wood, preferably boxwood, cut across the grain, that is, so that the surface is composed of the ends of the fibers. The artist draws his picture directly on the wood, or else it is copied from his drawing. The white wood is then cut away, so that the lines of the picture stand up like type. The block thus prepared is then set in a press and used to print from. In a wood engraving, the lines are pressed into the paper like the letters printed with type. Wood engraving is as old as the art of

printing. Indeed, it is supposed to have suggested type. The black cuts and the large initials of early books were printed usually from wooden blocks. Wood engraving took a fresh start in the latter part of the nineteenth century. The engravers employed on the *Century* magazine gave the United States an enviable reputation in this particular branch of art. The wood cuts that appeared in the London *Punch* were considered creditable.

Steel and copper engravings are produced by a totally different method. If the reader will consult the article on etching, he may find that the etcher uses a light needle with which to remove soft, yielding wax from the surface of his plate, and that the lines are bitten in by nitric acid; but the engraver on steel or copper cuts his lines with a sharp steel instrument called a burin or graver. It is guided somewhat like a pen, but is pushed through the tough metal by the palm of the hand resting on the handle. The engraver pushes his tool from him. Under a microscope an engraved plate is seen to be covered by what to a novice would seem to be a tangled mass of meaningless lines, dots and diamonds, but in reality, the work is systematic. Long parallel lines give an atmospheric impression. If crossed at right angles, they give a darker tone. Lines crossed obliquely by other lines are used to represent drapery, clothing, and other textures. Delicate, curving, parallel lines are used to delineate features, or a series of dots following a curve may be used to secure the same effect. A human head may be engraved by a single line led around and around with skill.

As in the case of an etching, the ink lies in furrows. When an engraving is produced by this method the lines are ridges instead of impressions. Naturally, the sharpest, clearest pictures are obtained before the plate is worn. The pictures of the first series are called artist's proofs. The second are simply proofs, and those printed later are the engravings of the ordinary trade. An artist's proof from the plate of a celebrated engraver brings an enormous price. This may be understood the more readily when we learn that an artist requires to spend years on a large engraving, and that the artist's proofs are few in number and cannot be duplicated.

See COUNTERFEITING.

Enid. See IDYLLS OF THE KING.

Enoch Arden, ē′nok är′den, a narrative poem by Alfred Tennyson, published in 1864. Tennyson has written no poem, unless it be *The Charge of the Light Brigade,* which is so popular with all classes of people as is *Enoch Arden.* Enoch Arden is a sailor who is shipwrecked,—cast away on an island. After years of loneliness he is rescued, and returns to find his wife married to an old friend. For her sake Enoch does not disclose himself. He dies brokenhearted. The poem is a finished and beautiful picture of humble but heroic lives. The passages descriptive of Enoch's renunciation are pathetic:

Now when the dead man come to life beheld
His wife his wife no more, and saw the babe
Hers, yet not his, upon the father's knee,
And all the warmth, the peace, the happiness,
And his own children tall and beautiful,
And him, that other, reigning in his place,
Lord of his rights and of his children's love,—
. . . . . .
He therefore turning softly like a thief,
Lest the harsh shingle should grate underfoot,
And feeling all along the garden wall,
Lest he should swoon and tumble and be found,
Crept to the gate, and open'd it, and closed,
As lightly as a sick man's chamber door,
Behind him, and came out upon the waste.
. . . . . .
Then the third night after this,
While Enoch slumber'd motionless and pale,
And Miriam watch'd and dozed at intervals,
There came so loud a calling of the sea,
That all the houses in the haven rang.
He woke, he rose, he spread his arms abroad,
Crying with a loud voice, "A sail! a sail!
I am saved;" and so fell back and spoke no more.
So past the strong heroic soul away.
And when they buried him the little port
Had seldom seen a costlier funeral.

Ensilage, in agriculture, fodder preserved in a green state. In the ordinary use of the word, ensilage is canned corn fodder. Any forage plant may be packed for ensilage, but green corn, not quite arrived at maturity, is preferred. A silo or pit may be built of any air-tight material. Wood is the material most generally used. Of late concrete is finding favor. A common wooden silo is of circular form, like a well. The deeper the silo the better.

Entail. See LAND TENURE.

Entomology, the study of insects. Packard states that insects comprise four-fifths by weight of the animal kingdom. 250,000 species of insects have been named and placed in museums. The total number is supposed to reach nearly 2,000,000. The study of insects is an important one, and has already saved the people of America many hundreds of millions of dollars. An excellent book for beginners is Comstock's *Manual for the Study of Insects.* See INSECTS.

Envelope, ĕn′vĕl-ōp, a paper pocket used chiefly for inclosing a letter. It is sealed usually by means of a flap or folded portion, faced at its edge with mucilage. As late as 1845 letters were folded so as to leave an unwritten portion outside for the stamp and address. They were sealed with wax. Envelopes did not come into general use earlier than the middle of the nineteenth century. At first they were made by hand, and were comparatively expensive. Since the invention of special machinery an entire ream of paper is cut into suitable pieces by a single motion of a sharp edged die.

Envoy Extraordinary, a representative sent from one country to another on a special mission, complimentary or political, of unusual importance. He represents the ruler of his nation and for the time ranks the regular diplomatic representative of that country. His office ceases when his mission is performed.

Eocene, in geology, a term applied to the lower division of the Tertiary strata. The Eocene beds are arranged in two groups, termed the Lower and Upper Eocene, the strata formerly called Upper Eocene being now known as Oligocene. They consist of marls, clays and sandstones, and are found in the Isle of Wight, in the southeastern part of Europe, in the northwestern part of France, in Central Europe, western Asia, northern Africa and on the Atlantic Coast of North America.

Eos. See AURORA.

Epaminondas, ē-păm-ĭ-nŏn′das (418-362 B. C.), a famous Greek general. He was a native of Thebes,—the greatest statesman and military genius that city ever produced. By his military genius he enabled Thebes to set aside Sparta, as Sparta had set aside Athens. The period of Theban supremacy in Grecian affairs began with the battle of Leuctra in 371 B. C. The flower of the Spartan army had marched on Thebes—it matters little what the immediate pretext might be. The Spartans were drawn up as usual in battle array, eight or twelve men deep. Epaminondas hit upon the plan of massing his forces, fifty men deep, opposite the wing in which the king and the choicest soldiers of the Spartans were arrayed. A thin line of Thebans threatened the rest of the Spartan front, but came slowly into action. The Spartan wing was crushed by the heavy attack. The king and 400 men were slain, and the day was lost to the Spartans and the supremacy of Greece was lost to Sparta. In 362 the same military tactics won for Thebes the victory of Mantinea, but Epaminondas fell on the field of battle, pierced with a javelin. He was told that he would die as soon as the javelin was extracted. Hearing that his army had won a complete victory, he drew out the javelin with his own hand, exclaiming, "I have lived long enough." A monument was erected to mark the spot. See THEBES.

Ephesus, ĕf′e-sŭs, an ancient city on the western coast of Asia Minor. It was the natural seaport of the kingdom of Lydia, the realm of wealthy King Croesus. It enjoyed an extensive commerce with Asia and Greece. An immense temple to an Asiatic goddess was built here. She was the deity of fertility, the mother of vegetation,—an embodiment of the productivity of the earth. Later, when Ephesus became a Greek city, this goddess was confounded with Artemis or Diana. In the year 356 B. C., on the night of the birth of Alexander the Great, an individual set fire to this temple that his name might not be forgotten in the world. This edifice, evidently consisting largely of wood, was replaced by a far more splendid temple. The women of Ephesus sold their jewelry and neighboring towns sent contributions, so important was the temple considered. Alexander offered to pay the

cost of its erection if he might be permitted to carve his name on the pediment, but his tender was rejected. When completed, the dimensions were 240 by 418 feet. The roof of marble tiles was supported by over a hundred sculptured marble columns. It was considered one of the seven wonders of the world.

This temple served several purposes. A vast number of priests and artificers lived in its precincts engaged in acts of worship and in making shrines and images for sale to worshipers. A refugee from justice might not be arrested within the shelter of the temple, and might even venture safely to a certain distance marked by a stone wall. After the city passed into Roman control Mark Antony found difficulty in controlling the horde of thieves that took advantage of this asylum.

The apostle Paul early established a Christian church at Ephesus. The Epistle to the Ephesians was a letter written, no doubt in his own handwriting, and sent to the church for the edification of the faithful. For some account of the reverence in which the temple was held and the excitement among the silversmiths, read Acts xix. A general council of the Catholic church was held at Ephesus 431 A. D. One hundred thirty-five bishops were present. The site is now occupied by a squalid village.

If after the manner of men I have fought with beasts at Ephesus, what advantageth me, if the dead rise not? Let us eat and drink for tomorrow we die.—I Cor. xv: 32.

Epic, a poem of length and completeness, of dignity in style and form, recounting the achievements of some hero. The name epic is from a Greek word signifying speech or discourse, but has come to be used to designate narrative poems of heroic character, as distinguished from those which are dramatic or lyrical.

Epic poetry seems to fall naturally into two classes:

1. The popular, or national epic, called also the epic of growth and the folk-epic.
2. The literary, or artificial epic, called also the individual epic and the art epic.

It will be seen that among primitive people many ballads, gests, or sagas would arise about some one hero, or concerning some one great event of common interest. A poet or a school of poets collects these songs and legends, and forms them into a complete whole, with more or less individual polishing, reshaping, and addition of passages. The folk-epic—the *Iliad,* for example—is the result. In all truly national epics, and in the greater of the art epics, the events described are represented as occurring under supernatural guidance. The literary or art epic is the entire production of an individual, but is of the character of the popular epic, that is, it is an heroic narrative of elevated and finished style. To deserve the name epic, it must be built up about some great structural theme or thought which is of universal, or at least of national import. The great national epics of literature are the following:

Greek.....*Iliad.*
German.....*Nibelungenlied.*
Anglo-Saxon....*Beowulf.*
Spanish.....*Poem of the Cid.*
Persian..... *Shah Nameh.*
Sanskrit.....*Ramayana,* and *Mahabharata.*
Finnish.....*Kalevala.*
French.....*Roland* or *Chanson de Roland.*

Among art epics the following may be mentioned:

Greek.....*Odyssey.*	Homer.
Roman.....*Aeneid.*	Virgil.
Italian.....*Jerusalem Delivered.*	Tasso.
English.....*Paradise Lost.*	Milton.
Portuguese..*Lusiad.*	Camoens.
German.....*Messias.*	Klopstock.
Italian.....*Divine Comedy.*	Dante.
American...*Hiawatha.*	Longfellow.

Scholars have found difficulty in placing certain of these epics. The *Iliad* and the *Shah Nameh* seem to belong in both classes. Some authorities place the *Odyssey* with the epics of growth. Epics are classified often according to their subject matter, as historical, sacred, heroic, etc., and poems which can hardly claim the name epic in its larger meaning are classed as some specific form of epic. For instance, Goethe's *Hermann and Dorothea* is called a domestic epic. Pope's *Rape of the Lock* and Butler's *Hudibras* are called mock-epics.

See ILIAD AND ODYSSEY; BEOWULF; NIBELUNGEN LIED; CID; LITERATURE; AENEID; CAMOENS; TASSO; CHANSON DE ROLAND; MILTON; KLOPSTOCK.

Epictetus, ĕp-ĭk-tē′tus, a Stoic philosopher of Rome. He flourished during the latter half of the first century A. D. He was banished from Rome during the reign of Trajan. His sayings were taken down by a devoted follower and disciple. Such teachings as have not been lost inculcate the idea of immortality and breathe a calm spirit of resignation and piety not unlike that of the New Testament writers.

SAYINGS OF EPICTETUS.

Difficulties show what men are.

Reason is not measured by size or height, but by principle.

Were I a nightingale, I would act the part of a nightingale.

Why, then, do you walk as if you had swallowed a ramrod?

No great thing is created suddenly, any more than a bunch of grapes or a fig.

What is the first business of one who studies philosophy? To part with self-conceit.

He is unreasonable who is grieved at things which happen from the necessity of nature.

Nothing is smaller than love of pleasure and love of gain and pride. Nothing is superior to magnanimity and gentleness and love of mankind and beneficence.

What we ought not to do we should not even think of doing.

No man is free who is not master of himself.

Fortify yourself with contentment, for this is an impregnable fortress.

Do not so much be ashamed of that disgrace which proceeds from men's opinions as fly from that which comes from the truth.

No man who loves money and pleasure and fame, also loves mankind, but only he who loves virtue.

Epicurus, ep-ĭ-kū′rus (341-270 B. C.), the founder of a Greek school of philosophy. His father, Neocles, was a schoolmaster, and there is a story that his mother practiced witchcraft. He studied and taught until about thirty-five years of age, when he purchased a garden in Athens, and therein established his school for philosophy. From this time until his death, he was the "loved and venerated head of a remarkable society."

He taught that pleasure is the chief good, explaining the statement by saying, "When we say that pleasure is the end of life, we mean by pleasure freedom of the body from pain and of the soul from anxiety." He taught that the great evil is fear—fear of the gods, and fear of death. He attempted to rid men of this fear by teaching that the legends of mythology were untrue. He claimed that, if gods existed at all, these "happy and imperishable beings could have nothing to do with the affairs of the universe or of men." As to death, he taught that the dissolution of the body involved that of the soul, so that death need not be feared. Virtue is not a good in itself, but is a means of happiness. Prudence, which means the wise avoidance of physical pain and anxiety of soul, is the great good. It is prudent to cultivate justice, temperance, friendship, and good fellowship.

Epicurus' philosphy, and possibly even more, his personality, attracted an immense number of followers, who remained loyal to him as long as he lived, and to his teachings after his death. It was a constant wonder to less popular sects why there were so many Epicureans. The members of the sect lived very simply. An inscription over the gate of Epicurus' garden warned those who entered to expect no more sumptuous fare than barley bread and water. This, with a little wine, and, when they wished to "fare sumptuously," some Cynthian cheese, formed their living. It is from a misunderstanding of their philosophy that the word Epicurean has come to be a synonym for the doctrine of taking pleasure in eating and drinking, and that we say of food, in order to praise it, that it is fit for an epicure.

Epicurus was a voluminous writer. According to his biographer, Diogenes Laertius, he left 300 volumes. Three letters and a few sayings are all that remain of these works. His system of philosophy found followers in Egypt, Asia Minor, and in Rome. In the seventeenth century a revival of the Epicurean ideas became popular in France. Molière, Rousseau, Voltaire, and other eminent Frenchmen professed these principles.

SAYINGS OF EPICURUS.

When we are, death is not; and when death is, we are not.

We cannot live pleasantly without living wisely and nobly and righteously.

Epidermis. See SKIN.

Epigoni. See SEVEN AGAINST THEBES.

Epigram, ĕp′ĭ-grăm, originally, an inscription placed on a tomb, temple doorway, statue, or triumphal arch. Naturally, bright sayings were chosen for such a purpose. The term has come to mean a bright thought tersely expressed, usually with a turn of wit. Words are used a little out of the ordinary meaning so as to create surprise. In general, any pungent way of saying a good thing is said to be epigrammatic. A good pun is an epigram. Many proverbs are epigrams. A few well worn examples are added:

Language is the art of concealing thought.
He was conspicuous by his absence.
When you have nothing to say, say it.
The obedient wife commands her husband.
Sweet are the uses of adversity.
Beauty when unadorned is adorned the most.
The more we have, the less we spend.
He is the richest who is content with the least.
The more busy we are, the more leisure we have.
The fastest colors are those that won't run.
The best way to contract debts is to pay them off.
The misfortunes hardest to bear are those that never come.
Under this stone my wife doth lie;
She is at rest, and so am I.

Epilepsy, ĕp-ĭ-lĕp′sy, a disease of the brain. It is characterized by a loss of consciousness and muscular spasms. The ancients called it the "sacred disease," fancying that one in an epileptic fit was taken possession of by a familiar spirit. In case of an attack there is little to be done, save to loosen the patient's clothing and see that he comes to no harm from falling. One subject to epilepsy is likely to suffer a loss of memory and to become despondent.

Epimetheus, ĕp-ĭ-mē′thūs, in Greek mythology, one of the Titans, brother of Prometheus. At the time of the creation of the world, the task of allotting to animals and man such attributes and qualities as should make for their preservation and happiness was given to these two brothers. It fell to Epimetheus to distribute, to Prometheus to oversee the work. Epimetheus gave courage to the lion, claws to the cat, a trunk to the elephant, a shell and long life to the turtle, sagacity to the fox, wings and talons to the eagle, and a keen eye and powerful legs to the ostrich. Then there was nothing left for man. Prometheus called on Minerva for aid, and with her help succeeded in lighting a torch from the sun. This was given to man, the gift of fire. When Zeus from above beheld a bright light he became enraged. He assembled the gods and decided to punish man. A new creature was then created—woman—and she was showered with gifts by the gods to make her irresistible to man, and also to cause him much trouble. She was named Pandora. She was accepted with delight by Epimetheus, although he was warned by his brothers. See PANDORA; PROMETHUS.

Epiphany, a festival held on the 6th of January by the Anglican, Roman Catholic and Eastern churches, in commemoration of the manifestation of Christ. Three distinct events are celebrated. The original celebration in the third century was the commemoration of the baptism of Christ and His revelation to the world as the Son of God. Later the manifestation of divine power in Christ's first miracle at Cana, in Galilee, was included. In the fourth century the birth of Christ became a part of it. In northern European countries Epiphany, under the name of Twelfth Day and Twelfth Night has been occasion for merrymaking, as incident to the close of the Christmas festivities. In the Roman Catholic Church the date of Easter is usually announced on this day.

Epiphytes. See AIR PLANTS.

Epirus, the ancient name of a division of Greece. Its eastern boundary was Thessaly, the southern the Ambracian Gulf and Aetolia, the western the Ionian Sea, and the northern Illyria and Macedonia. To the east was the mountain range of Pindus. The chief town was Dodona, situated on the fertile plain, Hellopia, (now Yanina). The region was inhabited by a number of tribes: The Sprotians, the Chaonians and the Molossians. The Greeks came in touch with them about 400 B. C., but it was not until the third century B. C. that Pyrrhus, a powerful prince, conquered Epirus. In 168 the Romans destroyed 70

towns in Epirus and united it with their empire. In 1430 it was seized by the Turks, then for a short period it was ruled by Scanderbeg, King of Albania, but it again came under Turkish sway. Since the fourteenth century the inhabitants of Epirus have been chiefly Albanians. It formed a part of the Turkish Vilayet of Yanina, but is now a part of Albania (southern), and northern Greece, the Greek portion corresponding to the department of Yanina. Population, Greece, 1921, 245,618.

Episcopal Church, a popular name for the Church of England and for the Protestant Episcopal Church of the United States and elsewhere. In form, the characteristic feature of Episcopacy is government by means of a body of superior clergy called bishops. They are, it is claimed, the successors in a direct and unbroken line of the twelve apostles. A bishop may be consecrated only by a bishop. This article of belief is held also by the Coptic, Armenian, Greek, and Roman Catholic churches. Bishops appear to have been recognized universally until the time of the Protestant Reformation. The Moravians of Pennsylvania maintain a form of Episcopacy, and claim also that their bishops are in an unbroken line of descent from the apostles.

In England and Wales the Episcopal is the established church. It is supported by public taxation.

In case the income of the parish is large it is not infrequently assigned to some religious order or to some layman whom the government desires to favor, while the pastorate is filled by an appointment at a salary. This possible arrangement has been the subject of fierce discussion, and is one of the reasons for the great number of dissenters who have left the Church of England. In case the pastor receives the entire revenue raised for the purpose, he is called a rector. A clergyman serving on salary paid by the institution or person holding the living is called a vicar.

In matters of theological belief the Episcopalians are staunch Trinitarians and upholders of two sacraments: baptism and the Lord's Supper. Nevertheless, there is considerable diversity of opinion. The wing of the church that exalts the prerogative of the bishop and makes much of the office, that is to say, the section of the church nearest Catholicism, is called High Church, the opposite wing is known as Low Church. Those who lean toward Unitarianism and similar unorthodox beliefs are said to be Broad Church in tendency.

So far as known, the first Church of England service in the New World was held on the coast of California in 1579 by the chaplain of the flagship of Sir Francis Drake. The first congregation was established at Jamestown in 1607. There are now about 5,806 clergymen and 1,087,037 adherents in the United States. The Episcopal form of worship is prominent in Canada, Australia, the cities of India, and wherever else the British flag is seen.

Epitaph, an inscription upon a tomb. Epitaphs were used by the ancient Egyptians, and by the Greeks and Romans. The tombs of the Romans were near the highways, and often their epitaphs commenced with the injunction *Sta viator!* meaning "Stop, traveler!" Many such inscriptions are very happy tributes. Among the best of them is found one in St. Paul's, London, to its architect, Sir Christopher Wren:

Si monumentum quaeris circumspice. "If you seek for his monument, look about you." Old English churchyards are full of stones carved with quaint and often ludicrous epitaphs. This is found at Edworth:

"Here lies father, mother, sister and I,
We all died within the space of one year,
They all be buried at Whimble except I
And I be buried here."

The following admonition is quite common in one form or another:

"All you that read these lines
Would stop awhile and think
That I am in eternity
And you are on the brink."

These lines were on little Stephen, a noted fiddler:

"Stephen and Time
Are now both even;
Stephen beat time,
Now time beats Stephen."

E Pluribus Unum, a Latin phrase meaning *Out of Many, One.* It is the motto of the United States. It was adopted upon the proposal of Franklin, Jefferson and Adams on July 4, 1776, and first appeared on the Great Seal. It has continuously appeared on United States coins, though it has never been officially adopted for that purpose.

Epoch. See AGE.

Epping (ĕp′ing) **Forest,** formerly an extensive tract of rough woodland sixteen miles northeast of London. It is now a region of villages and parks engaged largely in dairying. Queen Elizabeth had her hunting lodge here. It was customary for many a year to turn a stag loose on Easter Monday to be hunted for the amusement of the public. A remnant of Epping Royal Forest, about 3,000 acres, was acquired in 1871 by the corporation of London as a public park and place of recreation. The purchase, enlargement, and reforesting cost the city about $3,000,000. There are yet many magnificent beech and oak trees. The park is easily reached by suburban trains, and is a favorite place for picnic parties from the city. Tennyson was living in this forest when he wrote his *Talking Oak* and *Locksley Hall.*

Epsom, ĕp′sŭm, a small market town in Surrey, fifteen miles southwest of London. It has given its name to the famous Epsom salts, formerly manufactured there from the water of mineral springs found in the locality. This water is impregnated with sulphate of magnesium similar to that of Seidlitz waters. See DERBY.

Epworth League, an organization of the young people of the Methodist Episcopal Church. It was formed in May, 1889, at Cleveland, Ohio, much on the model of the Christian Endeavor society. Members take the following pledge:

I will earnestly seek for myself, and do what I can to help others to attain, the highest New Testament standard of experience in life. I will abstain from all forms of worldly amusement forbidden by the discipline of the Methodist Episcopal church, and I will attend, as far as possible, the religious meetings of the chapter and the church, and take some active part in them.

The society has extended its organization to many foreign countries, and now has a large number of members. According to recent statistics, there are 504,923 senior members and 207,144 junior members, showing a steady growth.

Equator, ē-kwā′ter, in geography a great circle, every point of which is 90° from the poles, that is to say, midway between them. It divides our earth into a northern and a southern hemisphere. The latitude of places, whether south or north, is reckoned from this circle. The equator is 7926.614 miles in diameter, or 24,912 miles in circumference. Owing to the turning of the earth on its axis, a point on the equator has a rotary motion of 1,000 miles an hour, but as the atmosphere moves with the earth we do not notice the whirling. Twice a year day and night are equal the world over. They are always equal on the equator. At all times half of the equator is in light and half in darkness. A wrong impression prevails that the equator is the line of greatest heat on the globe. Three factors are to be considered. In the first place, the longest day is to be found north of the equator during the northern summer, and south of the equator during the northern winter. This fact in itself causes the line of greatest heat to shift back and forth from north to south, so that, even theoretically, it coincides with the equator only at the fall and spring equinoxes. Furthermore, in crossing the mountains of East Africa, the equator rises into a cool region, and the Andes of Ecuador carry it up into a region of perpetual ice and snow, as cold as any point on the Arctic Circle. The trade winds of the southern hemisphere are the stronger and push back the northern winds, carrying the belt of calm and heat north of the mathematical equator. The equator should be associated with the idea of heat, therefore, in a modified way. In fact, the isotherm of greatest heat crosses the equator twice, but does not coincide with it at any time.

Equinoxes (equal night), two points in the sun's apparent path when day and night are equal. At midwinter our northern day is short and our night is long. The day grows longer and the night shorter until on or about March 21st, when day and

night are everywhere equal. This is the vernal equinox. The day continues to grow longer and the night shorter until midsummer, when the day begins to lose and the night to gain until, on or about September 22d, day and night are again everywhere equal. This is the autumnal equinox. The equator has a perpetual equinox; parts not on the equator have equal day and night but twice a year. The farther we recede from the equator, the greater the inequality between night and day. The equinoxes of the two hemispheres occur on the same date. Our vernal equinox is the autumnal equinox of Australia and Argentina.

Equity. See LAW.

Erasmus (1467-1536), a noted Dutch scholar and theologian. He was a native of Rotterdam; he died at Basel. His father and mother died young, and left him to the charity of others. His story is one of poverty and patronage, yet of marvelous independence. He was a chorister boy in the Cathedral of Utrecht. He was a talented lad. He entered a monastery in search of learning, but found the monks "coarse, ignorant, and illiterate." The Bishop of Cambray made Erasmus his secretary, and later sent him to cheap lodgings at the University of Paris, of which he says, "I carried away nothing but a body infected with disease and a plentiful supply of vermin." Erasmus escaped from dire poverty by taking up the work of tutoring. He went to England in 1497 with a young Lord Montjoy. For a number of years he eked out an existence by tutoring, traveling, and studying, writing and editing. He was at Cambridge, Oxford, Paris, Orleans, Louvain, Brussels, Bologna, Turin, Padua, Siena, and Rome. At Venice he supervised the printing of a book of his own on the Aldine Press. As his reputation for learning and eloquence grew, the sons of the powerful were eager to be known as his pupils. He received handsome fees for delivering Latin orations at coronations, receptions, and other public occasions. Influential people opened their doors.

Erasmus held various professorships, including the chair of Greek at Cambridge, but he was restless. In 1520 he settled down at Basel, then the center of the German book trade. Here he spent eight years editing Latin books, particularly the works of the Church Fathers—Jerome, Athanasius, Augustine, Origen, etc. After Basel, he lived in Freiburg, then back to Basel again, where he died.

Erasmus sat to Holbein for several portraits. A contemporary describes him as follows: "In stature not tall, but not noticeably short; in figure well built and graceful; of an extremely delicate constitution, sensitive to the slightest changes of climate, food, or drink. His complexion was fair; light blue eyes, and yellowish hair. Though his voice was weak, his enunciation was distinct; the expression of his face cheerful; his manner and conversation polished, affable, even charming."

Although he saw dire poverty in his youth, Erasmus was a man of elegant tastes, and was dependent upon the creature comforts of this world. The pope absolved him from his obligations as a monk. He dressed in the finest and softest clothing. In his travels, which were taken usually on horseback, he required the services of an attendant with an extra mule to carry clothing and table delicacies.

Erasmus' early work as a tutor of young men gave him a hold on public affairs. His scholarship brought him into intimate relationship with all the universities of the day. His service as an editor of the church classics brought him into favor with church authorities who had a love for learning; yet he could never be prevailed upon to take a position of importance for any length of time. Although a pensioner of Charles V, and in receipt of money from other crowned heads of Europe, he did not hesitate to write, "the people build cities, princes pull them down; the industry of the citizens creates wealth for rapacious lords to plunder; plebeian magistrates pass good laws for kings to violate; the people love peace and their rulers stir up war."

Erasmus holds a singular position. He was a man of thought, not of action. Although he lived in the stirring times of the Protestant Reformation he could not be prevailed upon to take sides. He lashed

the priests, monks, and convents; but he stood by the church. The motto was current in his lifetime that "Erasmus laid the egg and Luther hatched it," but Erasmus wished to reform the church, not to disrupt it. Luther and Melanchthon tried in vain to draw Erasmus into the Revolutionary movement. Luther's writings were offensive. Erasmus considered Luther's pamphlets vulgar and exaggerated. On the other hand, the pope and Wolsey and Henry VIII,—this before the English Reformation,—tried to induce Erasmus to condemn Luther and to declare against the German Reformation, but again Erasmus was unwilling to take sides.

He appears to have enjoyed an independence that permitted him to direct the shafts of his wit and satire at the abuses and scandals of the day, whether Protestant or Catholic. Nevertheless, he died a member of the church of his childhood. Erasmus wrote modern Latin, which in his day was a living and spoken tongue. He was familiar with English, French, and German; but he preferred to converse in Latin. It is not too much to say that he was the first man of letters of his day. Had he taken a positive side in the controversies then raging, he would have been extolled by one party or the other. As the case rests, Erasmus dropped, as it were, between Catholicism and Protestantism, and he is now little read.

Erato, ĕr′a-tō, in classical mythology the muse of lyric poetry. She is represented in art with a lyre in her hands. Erato presided over the songs of lovers. Her name is from the Greek word to love. See MUSES.

Erebus, ĕr′ē-bus, in Greek mythology, the son of Chaos and brother of Night. The word signifies impenetrable darkness, and was used to designate the gloomy cavern which must be traversed before the shades reached Hades. In the *Odyssey* and by later writers it is used as synonymous with Hades. The word has come to be symbolical of darkness. "Dark as Erebus," says Shakespeare

Erebus, a noted Antarctic volcano. It stands in latitude 78° S.; longitude, 170° E. Its snow-clad slopes rise from the border of the great ice barrier to the crater fourteen miles inland and 13,000 feet above the level of the sea. It is an active volcano lighting up the Antarctic night with a fitful glow heightened by frequent bursts of flame from the crater. The mountain has been built up by outpourings of lava. No flow has occurred in recent times, but a column of steam shoots up at intervals of time to a height of nearly a mile, and trails away in a cloud before the wind. The crater is described as 900 feet in depth and half a mile wide. Clouds of steam fill the bowl. The observations can be made only when a favoring breeze carries the steam aside or whips the crater empty. The atmosphere is redolent of sulphur. Feldspar crystals, two or three inches in length, many of them perfect in outline, lie strewn about. They all were once imbedded in pumice stone, but, as the latter disintegrated, it was blown away in the form of dust, leaving these beautiful crystals behind. The air is so cold that huge cones of ice form about the fissures from which steam issues.

Erechtheum, ē-rĕk-thē′um, the temple of Erechtheus, a Greek demi-god, on the Acropolis at Athens. It was built to honor two other Greek deities also, Poseidon, the sea-god, and Athene, the goddess of wisdom. In the temple were preserved the oldest existing statues of that goddess and the sacred olive-tree she created as a gift to the city. The building, which was rebuilt in the Peloponnesian War, is one of the finest examples we have of Greek architecture. It has three distinct chapels, one for each deity, and the famous porch of the caryatides, where in place of columns are great figures of women or caryatides, supporting the capitals. See ACROPOLIS.

Erg, the absolute unit of work or of energy derived from the fundamental units of the metric system. It is the work done by one dyne acting through a centimeter of space. The foot-poundal, or the work done by a poundal through a foot, is the English unit. These, particularly the erg, are too small for ordinary use. The practical or gravitational units in the respective systems are the kilogram-meter and the foot-pound whose names are self-explana-

tory. The former equals 98,000,000 ergs. See DYNE.

Ergot, er′gŏt, a kind of fungus that devours and finally replaces the seeds of rye and other plants. Like other fungi, ergot is propagated by means of spores carried by the winds or by insects. It is thought that the sap of a plant may carry spores upward from the earth to the young seed where they lodge and multiply. A head of rye affected with ergot turns brown, then black as the growth matures. Grasses related to rye are particularly subject to attack. Ergot is allied to corn smut and other fungi that grow in starchy grains. Cattle eating ergotty rye are likely to be poisoned. The natives of Russia, where rye is the chief food, are sometimes poisoned by rye ergot. The fungus produces a strong oil, not well understood, except that it has a powerful medicinal effect. Taken as a remedy it causes the heart and other involuntary muscles to contract with sudden spasms. The ordinary ergot of the drugstore consists of grain-like purple masses, from one-half to three-fourths of an inch in length, not unlike large grains of rye in shape. It is obtained chiefly from Russia and Spain. See FUNGUS.

Eric the Red, the founder of a Norse settlement in Greenland. He was born in Norway about 950. According to the current account, tradition rather than history, he fled from Norway to Iceland on a charge of murder. He was driven from Iceland for a similar outrage. He found a sheltered harbor in Greenland, but returned after three years to Iceland, whence he led a band of his followers to Greenland and founded a permanent settlement about 985. His son Leif Ericson introduced Christianity. The colony existed about 400 years, and was then wiped out by the Black Death.

Ericson, Leif, lēf, an Icelandic navigator. According to the Icelandic sagas, he was the son of Eric the Red. He sailed early in the eleventh century to some part of the coast of North America, and established a colony which he called Vinland because of the growth of wild grape vines. A statue in his honor adorns Commonwealth Avenue, Boston. See VINLAND.

Ericsson, ĕr′ĭk-son, **John** (1803-1889), a noted inventor. He was a native of Sweden. After reaching young manhood and serving a term in the army, he left the service and established himself as an inventor. Among other useful appliances was a contrivance for regulating the aim of a cannon on a pitching ship. Another was a successful hot air engine, and still a third invention was the screw propeller, now used almost universally on steamships. It consists essentially of a series of slanting blades attached to one end of a shaft. The propeller rests in the water behind the ship. The shaft runs through the hold of the ship to the machinery, where it is driven by steam power. As the shaft revolves, the screw propeller turns with it, thrusting the ship forward with a powerful stroke. Most ships are provided with a pair of twin propellers. In 1839 Ericsson came to the United States. His fame rests on the construction of the iron-clad, Monitor. It was built for the United States just in time to meet the Confederate iron-clad, Merrimac, in Hampton Roads, March 9, 1862. At his death the United States government sent an armed cruiser to convey his remains to Sweden. See MONITOR; BATTLESHIP.

Erie, a city of Pennsylvania, noted for its many manufactures and its harbor, the finest on Lake Erie. Commodore Perry made his headquarters here in the War of 1812, and built his famous fleet in the harbor. It is the only lake port in the state, and is the nucleus of a great water traffic besides being entered by five railroads. Among its manufactures are rubber goods, silk, leather, lumber, flour, paper, farm implements, boilers, forgings, engines, etc. It ships great quantities of coal to Duluth, to which city boats ply three times a week, and much iron ore and petroleum to other points.

Erie is on a bluff commanding a grand view of Presque Isle Bay, behind Presque Island, which protects the harbor. Several beautiful parks grace the city, and many handsome buildings. Some of them are the Court House, a Home for the Friendless, a United States Marine Hospital, the

Public Library, the Erie Club, St. Vincent's Hospital, State Soldiers and Sailors' Home, Hamot Hospital, the Y. M. C. A. building and the government building containing the postoffice and the custom-house. Its population in 1920 was 93,372.

Erie, ē′rĭ, one of the Great Lakes of North America. Lake Erie lies next above Lake Ontario. It receives the waters of Lake Huron through the Detroit River. Its greatest length is 240 miles. Its greatest width, 50 miles. Its area is 9,900 square miles. Ordinarily its surface is 570 feet above sea level. The greatest depth of Lake Erie is 210 feet. Its average depth is 100 feet. It is the one of the Great Lakes whose bottom does not extend below the level of the sea. It discharges its waters through the Niagara River to Lake Ontario. The southern coast has a number of excellent harbors, including those at Buffalo, Erie, Cleveland, Sandusky, and Toledo. Heavy storms create powerful undercurrents that render the navigation of the lake peculiarly dangerous. When a storm comes up on Lake Erie, captains of all but the largest boats aim to run for a place of shelter. Lake Erie is connected with Lake Ontario by the famous Welland ship canal, and with the Hudson River by the Erie canal running, by way of the Mohawk Valley, from Buffalo to Albany.

Erie Canal, an important canal in the state of New York. It leads from Buffalo on Lake Erie, through the Mohawk Valley, to the Hudson River at Albany. The Erie was constructed at state expense in 1817-26, largely through the determined efforts of Governor DeWitt Clinton and his political friends. The length of the canal is 387 miles. It is 70 feet wide at the bottom and is 7 feet deep. Buffalo is 568 feet above Albany. There are 72 locks. There is a lift at West Troy of 188 feet and another at Lockport of 54 feet. Stone aqueducts carry the canal across the Mohawk twice. The original depth was four feet. The original cost was $7,602,000. Subsequent deepening and widening and other improvements totaled up to $52,540,800. Some scandalous contracts swelled the latter figures.

The Erie Canal preceded railroads. A line of light packet boats drawn by horses at a round trot reduced the passenger schedule between Buffalo and Albany from the ten days required by stage service to three days and a half. The rate on freight drawn by long lines of teams was cut from $100 to $10, and later to $3 a ton. The canal did much to fill the valley of the Mohawk with settlers. It opened the way for emigrants bound westward and it formed a great highway for freight from the Northwest to the seaboard. The canal gave New York City an advantage over other Atlantic cities and did much to make it the metropolis of North America.

In 1917, the work on the New York State Barge Canal was completed. The system includes the Erie, the Champlain, the Oswego and the Cayuga and Senecal Canals. The minimum depth is 12 feet and the width varies from 94 to 125 feet. The work cost $150,000,000 and required ten years for completion. The length is 339 miles.

Erl-King, in German legend, a goblin or mythical being who haunts the Black Forest. The Erl-king is a malignant creature who entices children from their homes by promises or bright visions, and then destroys them. His influence upon all, young and old, is evil. Goethe's ballad, *Der Erlkönig,* and its translations into English are familiar. The word, *erl-king,* is from the Danish, and means king of the elves. Herder's translation of a Danish ballad introduced the Erl-king into Germany.

Ermine, er′mĭn, or **Stoat,** a slender, short-legged weasel, found in the northern parts of Europe, Siberia, and British America. Its fur is of a reddish brown in summer, changing to pure white in winter, with a black tip to the tail. The pelt of the ermine commands a high price. In England it is used especially to line the official robes of judges; hence the ermine has come to signify the judicial dignity. To soil the ermine, and to keep the ermine unspotted, are expressions referring to the conduct of a judge in office. Even in this country, where the judge dresses like other professional men,

we hear such expressions as that a judge ought not to drag the ermine through the mire of politics. As a fur, ermine is spotless white, a quality to which Lowell refers in his *First Snow Fall.*

> Every pine, and fir, and hemlock
> Wore ermine, too dear for an earl.

See WEASEL.

Ermine, or **Ermyn Street,** a Roman road leading northward from London, through Lincoln, to York, then to Hadrian's Wall. It left London by what became known as Bishopsgate.

Eros, ē′ros, in Greek mythology, the god of love. According to the account of Hesiod, Eros was the offspring of Chaos, brother to the goddess Gaea. Later accounts represent Eros as the son of Aphrodite and Hermes. His characteristics, and the various stories which grew up about his name, were adopted by the Romans for their Cupid. See CUPID.

Erosion, the process whereby, through the action of air and water, the products of rock decay are removed and the surface of the earth is worn down. Water has various rates of action upon different kinds of rock, and to this fact we owe the varying forms of valleys, hills, and cliffs. Erosion is carried on by rivers, which cut canons and gorges; the rain, which washes down the fine particles; the sun, which heats the rocks, thus loosening and detaching small particles; the frost, by the action of which water freezes in rock crevices and then expands and forces the sides apart; the sea, the wind, springs, glaciers, etc., and burrowing insects and animals.

Erysipelas, ĕr′ĭ-sĭp′ē-las, a bacterial disease accompanied by an acute inflammation of the skin, starting usually from a single point—often a wound—and spreading gradually. The skin on any portion of the body may be affected, but the disease more often starts on the face or head. The accompanying symptoms are fever, headache and nausea, and sometimes pain in parts affected.

Erysipelas is contagious and infectious. It used to be of common occurrence in military hospitals, terminating fatally in many instances. The disease is under better control than formerly, but is always serious, demanding the attention of a physician.

Es′calator, a device for carrying people from one level to another. As a substitute for the ordinary elevator or "lift", as they say in England, it has been found very satisfactory, for it can accommodate many more persons and is much safer. In appearance an escalator is quite like an ordinary stairway and may be used as such, but it really consists of an endless series of steps in constant motion, with a hand-rail moving at the same speed. Escalators have been installed in some of the great department stores, in a number of the large railway stations, and are used in going to and from the London underground railroad.

Eschscholtz, ĕsh′shōlts, **Johann** (1793-1834), a German naturalist. He was born at Dorpat, and, though he traveled widely, he died there. He was professor of anatomy in the university of his native town. As a physician and naturalist Eschscholtz accompanied the Russian navigator, Kotzebue, in exploring expeditions in the Pacific, 1815-18 and 1823-26. Eschscholtz Bay on the coast of Alaska was named for him. The California state flower, the delicate, yellow-flowered Eschscholtzia, bears his name. Eschscholtz published several volumes, including a *Zoölogical Atlas* and a *System of Acalephae,* the latter being a work on jelly fishes and allied forms.

Escorial, or, less properly, **Escurial,** a royal summer residence of Spain. It is situated about twenty-five miles northwest of Madrid. It was built by Philip II during the sixteenth century. It is one of the largest groups of buildings in the world. It is in the form of a huge rectangle, 744 feet from north to south, and 580 feet in width. The interior is cut into rectangular courts by intersecting walls. At each corner of the outer wall rises a tower. The plan of the whole building is intended to represent the gridiron of martyrdom lying upside down, that is to say, with its four legs upward. The outer wall is of gray granite. It is pierced by innumerable windows, said to be 11,000 in number, giving the peculiar aspect of a large mill or military barrack. There

are also 14,000 doors, affording communication from one part of the edifice to another. When completed it was called proudly the eighth wonder of the world. Tramping steadily upstairs and down it would not be possible to traverse all the passages, stairways, and rooms in a single day. The principal apartments of this peculiar edifice are the royal palace; a splendid chapel, 320 feet in length; a royal mausoleum; and a monastery. The mausoleum is a magnificently decorated octagon chamber, in which kings only and the mothers of kings are buried. Various apartments contain masterpieces of the great artists, including Raphael, Titian, and Rubens. A library of 20,000 volumes contains many priceless manuscripts—relics of Arabic learning. Although the Spanish people take great pride in the Escorial, other demands upon the public purse have prevented its being kept in good repair. It was struck by lightning in 1872 and injured seriously by fire. A school is maintained in the old monastery.

Eskimo, ĕs′kĭ-mo, a North American people. They range for 5,000 miles from Alaska, around the Arctic shores, to Greenland and Labrador. To this territory must be added 500 miles of coast in eastern Siberia. The Eskimos in some respects resemble the Mongolians of Siberia, but they are now classed as a division of the great American or Red Race. Although scattered in small parties throughout this immense territory, they are thought to number not over 40,000 in all. In their own language they call themselves Innuit, or the people, signifying that all others are to be regarded as outsiders or foreigners. The Eskimo is a sturdy, hardy fellow, with a long body and short legs, giving him a squatty appearance. His hands and feet are small. His skull is high. He has coarse, straight, black hair, black eyes, high cheek bones, and a broad nose. His complexion, once the smoke and grime are removed, is rather lighter than that of other Indians.

In dress, the men and women are much alike. Both sexes wear fur trousers and coats. The skins of the seal, the fox, or any hairy animal are used for clothing. The collar of the coat is prolonged into a sort of hood, to be drawn over the head in winter. This hood, which hangs down the back, is used by the Eskimo woman as a convenient place in which to carry a young child. In their houses both sexes remove the fur coat, and go about clad in trousers only. Tattooing is a common practice. The men have a curious habit of wearing a pair of large bone buttons or studs, the shanks of which are inserted through slits made in the lower lip.

Although waterfowl, fish, and various land and sea animals furnish a part of his support, the Eskimo is dependent chiefly on two animals,—the dog and the seal. In winter, though all other food fails, the seal is obliged to come up through holes in the ice to breathe, and is taken by the Eskimo, who lies in wait with his harpoon. This animal furnishes skins for tents and clothing. Its blubber furnishes oil and fuel and light. Blubber and flesh form the chief article of winter food. If a polar bear can be taken, so much the better; but the seal is the Eskimo's chief dependence. The Eskimo dog is a vicious, wolf-like animal of great endurance. It has been trained to draw sledges. With his dogs, the Eskimo hunter is able to make long trips, otherwise impossible, in search of seals. He carries with him a large fur sleeping bag in which he is able to sleep whenever fatigue overtakes him. We cannot say when night overtakes him, because in the Arctic region, the winter night is several months in length. The Eskimo is also an expert boatman. His kayak or canoe is made of skins stretched over a light frame constructed of bones or pieces of wood. A sort of skin deck is drawn up around the boatman's waist in such a way as to keep out water completely. He uses a paddle with great dexterity. With its help he is able to right himself without inconvenience, in case his boat should be overturned. With his kayak the hunter plunges through the surf fearlessly in pursuit of game.

The Eskimos live in small villages of a few families. In the summer time the families wander, seldom, however, going far inland; in winter they return, usually

THE ESKIMO

1. An Eskimo Man
2. An Eskimo Woman
3. Three Eskimo Children
4. Greenland Eskimo Before Their Cabin
5. Greenland Eskimo and Their Summer Tents

to the same locality, always on the seashore. They have great skill in constructing temporary houses of blocks of snow; but their permanent homes are made usually of stones, chinked with sods and covered with earth. The entrance is a low, half underground passage. An Eskimo home is far from attractive. The house has a fishy, oily smell, and is surrounded usually by offal. As a people they show an inclination to keep away from the whites and to preserve their own language and primitive methods of worship. Some progress has been made by the Moravian Brethren in Greenland, however, where most of the villages have embraced a form of Christianity.

White Eskimos. In 1910 the Arctic explorer Stefansson discovered on Coronation Gulf, about 100 miles northeast of Great Bear Lake, a tribe of what have since been called white Eskimos. These Eskimos differ widely from others in coloring and structure. Light—even red—hair and beards predominate, as do blue or grey eyes. The stature and weight of these people is somewhat greater than that of other Eskimos. Their culture, however, differs little from the darker, smaller Eskimos. except that they seem to prefer driftwood or log houses to the usual snow houses; but they are forced to use the latter the greater part of the time.

These people, who number about 2,000, live on both sides of Coronation Gulf, in complete isolation. Report of them had been made by other Eskimo tribes, and Nansen sought them before Stefansson, but was unsuccessful. It is rather generally believed that they are the remnants of Lief Ericson's expedition into Greenland in the tenth century, though proof of this is lacking.

See Reindeer; Peary; Greenland; Alaska.

Esparto or **Spanish Grass,** a tall grass native to the Mediterranean countries. It flourishes especially in the sandy, semi-arid sea slopes of Spain and Algeria, where it forms plots from ten to thirty feet in diameter. It is a leafy, hairy plant, from three to five feet high, closely related to the American feather grass, black oats, and porcupine grass. The fiber, in the leaves in particular, is exceedingly tough. Cables of the Spanish navy are made of this material. They are light and float on the water. Large quantities of esparto are collected in Spain and Algeria for cordage and paper material. See Sisal; Manila; Hemp.

Esperan'to, an artificial language proposed for international use by Dr. Ludwig Lazare Zamenhof, an oculist of Warsaw, Russian Poland. Dr. Zamenhof published his first pamphlet over the pseudonym "Esperanto," a word which, in the new language, means "the hoper."

Esperanto is much easier to learn than Volapük. In fact one who knows something of Latin, and is familiar with two or three modern languages can read Esperanto at sight with but little difficulty. Dr. Zamenhof based his language on some six or eight of the more important European tongues. The vocabulary, which is far smaller than that of Volapük, is made up as far as possible of Latin roots, and words common to several languages. Sounds, as the English *th* or the German *ü,* peculiar to any one language are omitted. A uniform pronunciation of all vowels and consonants, phonetic spelling, and a grammar so simple and so regular that it may be mastered, it is said, in an hour, combine to form a language that, although it has been followed by many others, seems to have met with general favor. Besides Volapuk there are other international languages, for such as Ido, Neutral and Bolak.

Essay, in literature, a prose composition in which an author presents not so much his knowledge of a subject as his thought upon it, giving us a little of his own mental or spiritual life as it has developed with and about the subject of which he writes. The word essay, or assay, an old form whose modern usage in the testing of metals may help to make clear the meaning, is from a Latin word and signifies a testing or trying out. So a literary essay is a testing of human thought. J. Rose Colby in a little book on *Literature and Life in School,* tells us that the essay is used by an author "for the direct confession of his beliefs, doubts,

loves, hates, prejudices, whims, superstitions, vanities, for his questionings of the meanings of things, his answers to his own questions, his ignorance, his vision of truth." The essay helps us, therefore, to know an author as we know our friends and is thus one of the most fascinating of literary forms.

As far as subject-matter goes, an essay is comparatively brief; it is not a finished production. Literary finish, however, grace, ease, and beauty of style are to be expected. The history of the essay as a distinct literary form begins near the end of the sixteenth century with Montaigne who wrote in a chatty, somewhat humorous vein on the social life of his times. Bacon, the first of English essayists,wrote on more serious topics and was followed by a long list of authors whose essays cover a great variety of subjects. Macaulay, Carlyle, and Matthew Arnold are writers of critical essays; Froude, of historical; Huxley, of scientific. Addison's essays are unequaled in graceful humor and good-natured satire. Lamb's *Essays of Elia* are delightfully entertaining and if a boy or girl would read essays there is nothing better to begin with. Other noted names are De Quincey, Swift, Milton, Johnson and Ruskin. Social, political, literary, and ethical subjects are treated in various ways according to the taste, talent, humor, and convictions of the author. In America Washington Irving was the first essayist in point of time, while Emerson has attained the highest rank.

Essen, a large town in the Republic of Bavaria, 18 miles northeast of Düsseldorf, was founded in the ninth century. There is a fine church there which dates from 873. The city is celebrated for the steel and iron works of the Krupps, the most extensive in Europe, which give employment to nearly 50,000 men. The management of the works has established cottages, churches, schools, stores, libraries, etc., for the benefit of the men employed and their families. Population, 439,257.

Estate, any interest held in lands, tenements or other effects. Estates may be real or personal. Real estate comprises lands, tenements and hereditaments held in freehold. Personal estate includes interests for terms of years in lands, tenements, hereditaments and property of every other description. Real estate descends to heirs, personal estate is taken in charge by executors or administrators.

In another sense estate means a social or political class, vested with distinct political powers. In England, historically, there are three estates. the lords spiritual, the lords temporal, and commons, but practically only two, the lords and commons.

In ordinary language, an estate is a piece of landed property; a definite portion of land in the ownership of some one.

Esther, Book Of, one of the canonical books of the Old Testament. It is a story of the deliverance of the Jews of Persia from destruction at the command of Haman, the Grand Vizier of King Ahasuerus of Persia. The heroine is a Jewess, Esther. The scene is laid at Susa, the court of Ahausuerus. The king has deposed his queen, Vashti, for disobedience to his orders, and has directed that search be made for a beautiful woman to take Vashti's place. Esther, a cousin of Mordecai, a Jew of the tribe of Benjamin, is selected as being the fairest. The story relates the threatened disaster about to overtake the Jews, owing to Mordecai's refusal to pay homage to Haman, the Grand Vizier. Through the machinations of Haman, the king issues an order for the wholesale slaughter of the Jews. But Queen Esther comes before the king, at Mordecai's solicitation, finds favor in the sight of the king, and begs him to spare her people. The request is granted, with the result that Haman is disgraced and executed, Mordecai has honors heaped upon him, and clemency is extended to the Jews.

Esthetics, or **Aesthetics,** the science which aims to deduce from nature and taste the rules that govern art. It is also defined as that branch of philosophy which deals with the principles of the beautiful. It is an elusive study, and one which requires a broad knowledge of the fine arts before it can be pursued to advantage.

The profoundest works on the subject are those of German philosophers, Kant, Leibnitz, Wolff and Baumgarten. Plato, over 2,200 years ago, formulated a theory

of art in its relation to life which is, briefly, that only such art as directly helps fit one for a life of courage and temperance should be tolerated. His theory is based upon the teachings of Socrates.

Esthonia, Republic of, comprises the former Russian province of Esthonia, the northern part of the former Russian province of Livonia, the islands of Moon Sound, a part of Pskov government, and the Godovski district of the Petrograd government. The boundaries between Esthonia and Russia were settled by the Peace Treaty of February 2, 1920, and those between Esthonia and Latvia on July 3, 1920. The total area is about 23,160 square miles. Half the area of Esthonia was formerly taken up by large landed properties, but by the passing of the Agrarian Reform Bill in 1919 these estates were divided among the peasants.

The chief industries are the manufacture of textiles, chemicals, metal products, mining and shipbuilding. Before the war the men engaged in the different industries numbered 50,000, but in 1920 the number was reported to be from 8,000 to 9,000. Esthonia's imports and exports are almost entirely from and to Great Britain and Germany. The chief imports are petroleum products, fish, salt and fertilizers, and the the chief exports are flax, paper, spirits and timber. There are two regular freight and passenger steamships plying between Reval and Stockholm, and a regular Finnish service between Reval and Helsingfors. The population is about 1,750,000, of which 90 per cent is Esthonian. The language is Esthonian, but Russian and German are also spoken. The capital is Reval, at the mouth of the Gulf of Finland, founded in 1219.

Etching, a method of picture making; also a picture produced by this method. Strictly speaking, a plate of metal is etched and the picture is printed from the etched plate. Etching differs from engraving. In the latter the lines are formed by a steel tool held in the hand of the engraver. In etching, the lines are etched or bitten out by the action of an acid. The etcher uses a thin plate of metal. It must have a highly polished surface. For a picture requiring broad, black lines, zinc is preferred; for fine, delicate lines copper is superior. Both copper and zinc are readily eaten or bitten by an acid. The artist first prepares his plate by warming the surface and rubbing it with a silk bag containing a delicate sort of asphalt. In this way he coats the entire plate with a varnish that nitric acid cannot attack. As this varnish is transparent, it is smoked to turn it brown, a color that shows lines well.

The artist then draws the desired picture on the varnished surface with a fine steel tool called a needle. The point of the needle removes the varnish wherever it passes. Care is taken not to scratch the metal. As the point of the needle plays easily on the waxed surface, the artist is as free as though using a pencil or pen on a sheet of paper. When his drawing is complete the etcher puts on a pair of rubber gloves and immerses his plate in a shallow basin of weak nitric acid. The acid bites or etches lines in the metal where the needle of the artist has removed the protecting varnish or wax. As soon as the etcher thinks the most delicate lines, as, for instance, sky lines, are bitten deep enough, he removes the plate from the bath and protects such portions by a coating of varnish—stopping out, this is called —and returns the plate to the acid. By the use of stopping-out varnish, as many degrees of delicacy and emphasis as may be desirable may be had. The advantage of both heavy and light lines is secured in this way.

When the etching is completed, the varnish is removed by washing in turpentine. The plate is then fastened on a wooden block or back. The printer planes off a shaving or pastes on paper as may be needed to give the exact thickness required for printing. Not infrequently the lines do not print well, and it is necessary to return the plate with a proof to the etcher for correction.

In printing, the etched lines are filled with ink and the rest of the surface is wiped off. By leaving slight traces of ink on the surface, fine, soft tints are obtained, giving the etching a rich, mellow effect. The furrows of an etched plate

are hollowed out usually by the burrowing of the acid under the edges of the lines, giving a greater capacity for holding ink than if they were made by a tool. One who is skilled can tell an etching by passing his finger tip over the paper. The lines form little ridges of ink quite perceptible to the touch, and quite different from the lines of a woodcut or ordinary letters which create depressions.

Skillful etching requires not only a creative and artistic mind, but a skillful eye and hand. Of noted etchers, the artist Rembrandt is yet considered unsurpassed.

See ENGRAVING.

Eternal City, The. See ROME; CAINE, HALL.

Ethelwulf, (?-858), the father of Alfred the Great, was King of Wessex and Kent. He was the son of Egbert, whom he succeeded about 839. His kingdom was harassed by frequent invasions of the Danes, but Ethelwulf usually left the defense of the realm to his officers whom he appointed to organize the maritime districts. Ethelwulf made a pilgrimage to Rome, and on his return, 856, found that his son Ethelfold had usurped the kingdom. In order to avoid civil war Ethelwulf allowed his son to rule Wessex while he ruled Kent. Alfred the Great was the youngest of his five children.

Ether, in the ordinary use of the word, a light, colorless liquid having a refreshing odor and a sweetish, burning taste. It evaporates rapidly. It is so inflammable that it is classed as an explosive. It is a union of carbon, hydrogen, and oxygen. It is prepared by distilling a mixture of five parts of alcohol with nine parts of sulphuric acid. When a little of it is poured out in the palm of the hand it evaporates quickly, leaving a cold sensation. During evaporation it absorbs heat so rapidly that a fine spray of ether may be used to freeze, that is to say, harden, the tissues for the dissector's knife. The fumes of ether are used by surgeons to produce unconsciousness. See CHLOROFORM; SURGERY.

Ether, in physics and astronomy, the name given to the substance which it is assumed fills all space beyond our atmosphere. It is thought that light is a vibration of ether. It is thought also that heat, gravity, and electricity are dependent upon ether for their existence as forces of nature. No one knows exactly the nature of this stellar or cosmic ether, and some scientists reject the idea of its existence. Its acceptance has been brought about because it offers a satisfactory explanation of the phenomena of radiation, refraction, diffraction, and polarization of light.

Ethics, in its broader meaning, the science of ideal human character. Ethics may be considered from the critical viewpoint in which an abstract system of ethics is evolved as a standard or from the more practical viewpoint of our common acts in everyday life. The first consideration is of value in establishing standards to which we may look for guidance; the second, brings us in closer contact with the subject and enables us to realize its presence in all our acts. In its practical application ethics treats of the moral obligations one person owes another, and outlines the rules which should determine conduct. Every act affects the character of the individual and also influences society. The first result is direct, the second is usually indirect. Society consists of individual members and each from his character radiates an influence that aids in fixing the moral standard.

The moral phase of an act is recognized in the consciousness of antagonism between motives. This conflict gives rise to the feeling of obligation. Shall I take a pleasure trip? Shall I buy this fur coat? The weather is cold, the coat will be an excellent protection, but do I need the coat? The one I now have is comfortable, and the price of the coat would enable me to pursue a course of study in night school.

Shall I take my son Henry into my office and train him to become my successor in business? The business is prosperous and such an opening for a young man is exceptional. But Henry has a desire to study medicine. What is my duty?

The question of right and wrong is constantly before us and each must decide it for himself; yet he need not carry the

burden entirely alone. The experience of others is often a safe guide and the understanding of a few underlying principles will be found helpful.

1. Self-consciousness is essential to moral consciousness. Without the former the latter is impossible. I must recognize both the act and myself as the doer to give the act a moral quality.

2. A conflict of desires or motives lies at the foundation of a moral act. If there were no temptation there would be no morality.

3. The consciousness of obligation attaches to moral acts. We recognize this in the feeling of ought. I ought to conform to the customs of my host's household when I am his guest. I ought not disturb others in a public assembly, etc.

4. A complete moral act includes the activity of all the mental powers. It consists of three steps. (a) Knowledge. I must know whether the act is right or wrong before I can determine its moral quality. (b) Desire. The act must be volitional and the knowledge gained leads me to desire to perform it. (c) From the knowledge and desire I must choose to perform or not to perform an act. (d) Action. Having made the choice I must carry it out. The act must be done or dismissed from my mind.

Early Training. The greater and more influential part of the child's moral training is indirect. It is also lasting. The child who lives in a home whose inmates are actuated by courtesy and kindness and where the atmosphere is that of love and gentleness naturally acquires these habits and manners from his elders. Moreover, children naturally follow the ideals of their parents. The mother is the child's first and most influential teacher and her influence during the first ten years of the child's life will never be eradicated. The most important work of the home and the school is character building. The great majority of the morally delinquent failed to receive proper moral training during their childhood and youth.

Importance. In democracies like the United States and Canada, the government derives its authority from the consent of the governed, and that means public opinion. If such a government is to succeed it must have a public with an enlightened conscience.

With the multiplicity of industries and extended foreign relations life is constantly becoming more complex and public questions more difficult of solution. There never has been a time when moral training in the home, in the public schools and other educational institutions was more needed than at present. Every citizen needs that moral training which will give him a clear conception of right and wrong, and strengthen him in deciding for and adhering to the right.

Ethiopia, ē-thi-ō′pĭ-a, among the ancients, a term applied to the southern part of the world inhabited by people of dark complexion. The word is Greek, meaning literally a burnt countenance. In its widest application the name covered those parts of Asia inhabited by the dark-skinned Hindus as well as the Africans. In its modern use the term is applied to that part of Africa which is inhabited by the negro race. In a more limited sense the term is applied to the present region of Nubia and Abyssinia, and, in its lowest limits, Ethiopia was the land of Kush, belonging to Egypt, a country noted for ivory and aromatic spices.

Ethnology. See Races of Man.

Etiquette, a term signifying the usages and ceremonies in vogue in what is termed society. The original meaning of the French word etiquette is label, and it no doubt grew into this secondary meaning from a former custom of distributing tickets or slips of paper to guests invited to court or ceremonial affairs, on which were written instructions to be observed. The Spanish and French courts in former times were noted for the strictness with which court usages and customs were enforced. To become versed in what is nowadays understood by the word etiquette one must have a wide familiarity with society and its customs. There are many observances and rules in society, which, while intrinsically of little value, nevertheless demand a certain amount of respect. However, a kind heart, tact and delicacy

of perception will carry one through almost any situation.

The terms "legal etiquette" and "professional etiquette" are often heard, but there is a growing tendency to substitute the expression "professional ethics."

Etna, or **Aetna, Mount,** a volcano situated on the shore of the island of Sicily. It is the largest active volcano in Europe. It is a huge mountain mass rising directly from the coast to a height of 10,835 feet, —a half higher than Mt. Washington. A large number of auxiliary craters are situated like bubbles around the upper part of the cone. The base of the mountain is about thirty miles in diameter. Like other volcanic soils, the slopes are fertile, and are occupied by villages whose inhabitants are engaged in the cultivation of figs, dates, oranges, and olives. A higher belt produces the chestnut, birch, beech, and pine. Not less than 400 eruptions have been recorded, several of them destructive to human life. In 1669, 10,000; in 1693, 60,000 lives were lost. In 1755, another destructive eruption took place. The years 1852, 1865, 1874, 1879, 1886, and 1892 were marked by eruptions. Among the theories by which the ancients strove to account for the activity of Etna was the legend of Enceladus. According to this legend he was one of the hundred-handed Titans who made war against the gods. Jupiter slew him with a thunderbolt and buried him deep beneath the mountain. According to some legends, Vulcan, the Roman god of fire and the patron of blacksmithing, had a forge in Mt. Etna, where he employed the Cyclops in fashioning thunderbolts for Jove. Tourists are enabled to ascend the mountain by a railway which encircles it like a spiral. The railroad is seventy miles in length.

A violent eruption occurred in 1911, when torrents of lava, falling into the valley caused the loss of many lives.

Eton, an English village on the east bank of the Thames, opposite Windsor Castle. It follows the windings of a single street, and contains about 3,500 people. Its celebrity is due to Eton College, a school for boys, established by Henry VI in 1440 under the name of the "College of the Blessed Virgin Mary Beside Windsor." The course is chiefly classical. About 1,000 boys are in attendance. The school was established for poor boys; but it is now the most aristocratic school in England,—a condition fostered, no doubt, by the royal residence at Windsor.

Etruria, a district of ancient Italy lying next north of Rome. It was the seat of an early civilization preceding that of the Romans. The Etruscans, as they are called, have left numerous inscriptions, especially on their tombs. Their language appears to have differed from that of the Greek and all other European languages. Their customs and methods of worship are little understood. They buried their dead in subterranean tombs. They were an agricultural people and produced grain, wine, timber, cattle, and wool. They appear to have had dealings with the merchants of the Mediterranean. They worked iron and copper mines and were skilled in the manufacture of articles from these ores. They were proficient workmen in bronze, silver and gold. They used bronze mirrors and made bronze candlesticks. They were celebrated makers of pottery and ware of the sort known as terra cotta. The Etruscan vases noted for their elegance and beauty are, however, a later production of Grecian art. Some are of terra cotta color with black figures and ornaments. In others the groundwork is colored black, while the figures are of the natural red terra cotta hue. The Etruscans are thought to have taught the Romans the use of the arch; how to dress; how to build ampitheaters; divination; soothsaying, and the making of pottery. Their origin is considered one of the riddles of history. They were a broadheaded people, allied, it has been suggested, to a similar people in Switzerland.

Ettrick, ĕt′rĭk, a district of Scotland in Selkirk, about a day's horseback ride to the south of Edinburgh. The Ettrick water and the Yarrow unite and flow into the Tweed a mile or two above Abbotsford. The region was at one time covered with the famous Ettrick forest. It is now a sheep pasture. "The Ettrick Shepherd" is the pen name of James Hogg, a some-

what celebrated Scottish writer. See HOGG; YARROW; TWEED; EDINBURGH.

Etty, William (1787-1849), an English painter. He studied at the Royal Academy and later traveled in Europe, particularly Italy. From his study of the Venetian masters, he acquired a taste for rich coloring, a characteristic of his work. The composition of his pictures is good, but they lack vigor and originality. His principal works are the *Judith* pictures, *Ulysses and the Sirens, Beniah, David's Chief Captain,* and three pictures of *Joan of Arc.*

Etymology, that branch of philology which investigates the origin of words and traces the history of the changes in form and in meaning which they have undergone. The word is applied also to the origin and history of any one word. The modern sciences and recent inventions have names taken from the Greek. Their etymology is simple; for instance, graph, is a Greek root signifying writing; log, another, meaning speech or word. These roots combined with other Greek words give us:

Tele-*graph* .....at-a-distance writing
Auto-*graph* .....self-writing
Photo-*graph* .....light-writing
Phono-*graph* .....sound-writing
Hecto-*graph* .....hundred-writing
Geo-*logy* .....earth-word
Theo-*logy* .....god-word
Philo-*logy* .....love (of) word
Physio-*logy* .....nature-word

When a word has existed for centuries, passed through several languages, and numerous changes have occurred in its spoken and written form, its etymology becomes a much more difficult matter. It is only within a century that etymology has become, in any true sense, a science. Previous to that time, although the use of words must have aroused the curious and interested the learned, no accurate or classified knowledge existed concerning them. The quick-witted and the imaginative have suggested many false etymologies; as, for instance, that the word "news" was formed deliberately from the initial letters of the four words used to designate the points of the compass, north, east, west, south; or that "sirloin" was originally Sir Loin, the loin having been knighted as the best part of the animal; or that welshrabbit must have been once Welsh rare-bit. Such etymologies are only clever, they are neither wise nor accurate. To find a true etymology, the philologist aims first to learn the earliest form and meaning of the word. In this work he must observe the laws of phonetic change, an understanding of which involves the comparative study of many languages and dialects, almost the work of a lifetime. A good modern dictionary gives simple etymologies. An etymological dictionary naturally gives more complete and accurate ones. The great purpose of studying words is that we may use them with accuracy and force. For example, we hear often the words "expect" and "anticipate" used synonymously. Studying their etymologies we find expect is from the Latin "ex" and "spectare," and means "to look for," while anticipate is from "anti" an old Latin form of "ante," meaning "before," "capere" "to take," and the suffix "ate." It means "to take before" or "to forestall." We may not say, therefore, "I anticipate a pleasant winter," but "I expect a pleasant winter." When Byron in describing a shipwreck writes,

> "Then some leap'd overboard with fearful yell,
> As eager to anticipate their grave."

he uses the word correctly. So the etymology of many other words will help one to that accuracy, which, as Ruskin tells us, marks "the entire difference between education and non-education." If one knows the etymologies of the words he uses he will not say "anxious" for "desirous," "propose" for "purpose," "hurry" for "hasten." If he once learns that the last syllable of "pantomime" is from "mim," the same root as that formed in "mimic," he will never say or write "pantomine" again, nor will he say "presperation" for "perspiration" and "perscription" for "prescription" when he has learned the origin of these words and the significance of their prefixes.

Euboea, formerly called Negropont, a Greek island, the second largest in the Aegean Sea. It is 90 miles long, 30 in greatest breadth, reduced at one point to 4 miles. It is separated from the mainland of Greece by the narrow channels of

Egripo and Talanta, and connected with the Boetian shore by a bridge. There are several mountain peaks over 2,000 feet high and one over 7,000 feet. The island is well wooded and fertile. Wine is a staple product, and cotton, pitch, wool and turpentine are exported. The island yields a large amount of ore and minerals. There are several medicinal springs, the waters of which have been esteemed for their curative properties since ancient times. Chalcis and Karysto are the chief towns. According to Greek tradition, the Abantes and Dryopes were the earliest inhabitants. After the Peloponesian War Euboea became independent. Population, 127,876.

Eucalyptus, ū-kà-lĭp′tŭs, a genus of trees peculiar to Malaysia, Australia, and Tasmania. They are known also as gum trees and stringy barks. There are numerous species—about 150 in all. The eucalyptus is of rapid growth. One tree is mentioned with a height of 480 feet and a diameter of 81, surpassing even the gigantic sequoias of California. The wood is valuable as fuel. It possesses strength and durability. In Australia, eucalyptus lumber takes the place of American pine for bridges and general building purposes. Blocks of eucalyptus are used for paving the streets of Sydney and other Australian cities. An illuminating gas may be obtained from the wood by destructive distillation. A ton of wood yields 10,000 cubic feet of gas. The bark is used in tanning. The leaves are leathery. Those of many species turn their edges to the sun, a position which enables the tree to stand severe drouth. A fragrant oil is distilled from the leaves. It resembles camphor in some respects. It makes valuable varnish. The tincture of eucalyptus has an odor like that of cubebs. It is a remedy for asthma, bronchitis, and whooping cough. It also takes the place of quinine as a remedy in case of fever, and is an excellent antiseptic dressing for wounds. Because of its medicinal properties the culture of the eucalyptus tree has been recommended in malarious districts for the purpose of counteracting miasmatic influences. One species of eucalyptus, the blue gum, has been introduced widely in warm countries, notably in Spain, Algeria, Egypt, India, Florida, and southern California. This tree is cultivated for its timber. It withstands drouth well, but cannot endure frost. The flowers are without petals. They resemble those of the myrtle.

Euclid, yoo′klĭd, a famous Greek mathematician. He taught geometry in the noted school at Alexandria about 270 B. C. He wrote a work in thirteen books called the *Elements of Geometry*. Modern textbooks on the subject follow essentially the lines marked out by Euclid. His *Elements* without alteration might still serve as an excellent text. Many, in fact most, of his demonstrations, in point of brevity, clearness, and accuracy cannot be improved. In order to demonstrate the fallacy of perpet ual motion devices, it is the practice in the United States patent office to cite the propositions of Euclid. No such device has ever been presented in an application for a patent which has not been disproved by reference to Euclid. See GEOMETRY.

Eugene Aram, a novel by Bulwer-Lytton published in 1832. *The Dream of Eugene Aram* is a poem by Thomas Hood.

Eugene, Ore., the county seat of Lane Co., is pleasantly situated on the Willamette River, 124 miles south of Portland and 50 miles from the Pacific Ocean. It is served by the Southern Pacific, the Oregon Electric and other railroads. Eugene is the commercial center for the fertile upper Willamette Valley, noted as an agricultural region and for its wealth of timber. Gold and silver are also found here. In the city are manufactured sashes and doors, furniture, lumber, excelsior, flour and woolen goods. Eugene is the seat of the University of Oregon and of the Eugene Bible University. It has a Carnegie library. The population was 10,593 in 1920.

Eugene, Prince (1663-1736), an Austrian soldier. He was a native of Paris. He applied to Louis XIV for employment as an officer, but was repulsed on account of personal opposition from a high source. In indignation he turned to the emperor of Austria with greater success. He rose to be the commander-in-chief of the Austrian forces. He ranks with the greatest

of modern generals, and is, without doubt, the ablest soldier in Austrian history. In 1697, and again in 1716, he prevented the Turks from invading Austria and possibly taking possession of Central Europe. His assault and capture of Belgrade, a Turkish stronghold on the Danube, is one of the notable sieges in history. In the meantime, during the wars between Austria and France, he had ample revenge for the slight put upon him by his native country. In conjunction with the English Duke of Marlborough he won the great battles of Blenheim, 1704; Oudenarde, 1708, and Malplaquet, 1709, in the War of the Spanish Succession. See UTRECHT, PEACE OF.

Eugenics, the science of race culture or race improvement. The word "eugenics" is from the Greek, and signifies "well born." It was suggested as a name for this science in 1904, by the late Sir Francis Galton a cousin of Charles Darwin, and the author of several works on heredity and kindred subjects. The term embraces "the study of all the influences that improve the inborn qualities of the human race, and tend to develop them to the utmost advantage." Since the time of Darwin, scientists have admitted that laws concerning heredity and environment might be deduced which would explain accurately the improvement or retrogression of the race. That, under existing conditions of social laws and sentiments, any practical application of such laws could be made, was considered impossible. Such application of nature's laws would seem to involve paternalism, that is, the control by government of the life of the individual, especially as regards marriage, and environment during childhood. Luther Burbank says in his little book on *The Training of the Human Plant*: "It would, if possible, be best absolutely to prohibit in every state in the union the marriage of the physically, mentally, and morally unfit."

That a real need for the study of race-culture is felt to exist, is evidenced by the fact that institutions of higher learning are equipping courses in this department of investigation. Sir Francis Galton bequeathed $250,000 to the London University to endow a chair of eugenics.

In some of the states of the United States laws have been enacted to prevent the marriage of the unfit. Wisconsin requires a physical examination of the male applicant for a marriage license. Oregon and Pennsylvania have similar laws though less stringent. Many states forbid the marriage of epileptics, the insane, the feeble-minded and other persons physically or morally unfit. In California the intermarriage of different races is forbidden. In institutions for the education of the deaf and the blind the sexes are kept separate and every possible effort is made to prevent the marriage of the congenitally deaf and blind.

However, education is more effective than laws. An awakened public sentiment in favor of better physical development of both men and women and a greater sense of the responsibility of the present generation for their offspring is essential to the improvement of the race.

Eugenie, Marie De Montijo, uh zha neé de monteé ho (1826-1920), the widow of Napoleon III, and former empress of France ,died in Madrid, Spain, July 11, 1920. She was born in Granada, Spain, and was the daughter of Countess De Montijo. She married Napoleon III, in 1853, and during his reign was known for the brilliancy and extravagance which she displayed at the French court.

Upon the overthrow of Napoleon, at the end of the Franco-Prussian War, in 1870, Eugenie took refuge in England, where she resided most of the time. During the Great War, she converted a portion of her residence into a hospital for wounded officers.

Euphrates, u-fra'tez, the historic river of Mesopotamia. It rises in the Armenian Mountains, receives the waters of Lake Van, makes a wide circuit to the westward, breaks through the mountain chain of Taurus, and meanders southward to a junction with the Tigris,— a twin river borne on the eastern side of the same mountains. The lower portion of the valley is naturally one of the most fertile sections in the world. During the winter months there is little water, but in the late spring and early summer an immense amount of water

from the melting snows comes down, causing the river to overflow. As its snows lie on northern and western slopes they melt late in the season and the floods of the Euphrates are a month later than those of the Tigris. The geographical conditions are very similar to those of lower Egypt; in fact, the Mesopotamia, or the country between the Tigris and Euphrates, has been called the Egypt of Asia; and Babylonia is said to be "the gift of the Euphrates and the Tigris." An immense amount of silt is brought down by the spring floods. The head of the gulf of Persia has been filled up to such an extent that an ancient seaport, formerly at the mouth of the river, is now 100 miles from the gulf. See SYRIA; BABYLONIA; BAGDAD; NINEVEH; MESOPTAMIA.

Eurasia, a geographical word formed from Europe-Asia. It is a term used by geographers to denote the land mass of Europe and Asia between which there is no natural line of division. The want of a natural boundary is emphasized by the need of such expressions as Russia-in-Europe, Russia-in-Asia, Turkey-in-Europe, and Turkey-in-Asia. The combined area of Eurasia is 18,265,000 square miles. Population, 1,232,200,000.

Eurasian, a half-caste of India, particularly one born of a European father and a Hindu mother. The name was applied originally to the descendants of Portugese officers, but it has become general in its application to persons half European and half Asiatic. The Eurasians are most numerous in the capital cities, as Calcutta, Bombay, and Madras.

Eure, a river in France which flows into the Seine. It is in the northwestern part of the country, flowing first in a southeasterly direction, then north and northwest through the departments of Eure-et-Loir and Eure. Upon reaching Pont-de-l' Arche, it joins the Seine. It has a length of 112 miles, 50 of which are navigable for river boats.

Eureka, an industrial city and the county seat of Humboldt County, California, is on Humboldt Bay and on the Northwestern Pacific Railroad, 224 miles directly north of San Francisco. The city has steamer connection with Pacific Coast ports, and has several miles of wharfage. Federal aid in the improvement of the harbor has resulted in the city's becoming the shipping point for a large and valuable agricultural and lumbering region. Wool, fruit, fish, dairy products and lumber are the principal articles of trade; and the manufactories are almost all connected with the lumbering industry. Eureka has a fine public school system, and is otherwise modern. In 1920 the population was 12,923.

Euripides, ū-rĭp'ĭ-dēz (480-406 B. C.), a celebrated tragic poet of Athens. According to popular tradition, he was born on the day of the defeat of the fleet of Xerxes. His birthplace was the island of Salamis to which his parents had fled for refuge from the burning city. His rivals for honors at the hands of the Athenian people were Sophocles and Aaeschylus, both of whom are ranked above him by modern critics. He wrote seventy-five plays, of which eighteen are extant. His subjects were drawn chiefly from Grecian mythology. The most celebrated are perhaps the *Alcestis, Medea, Andromache, Iphigenia at Aulis, Electra, Orestes,* and *Cyclops.* See AESCHYLUS; SOPHOCLES; DRAMA.

SAYINGS OF EURIPIDES.

Cowards do not count in battle.
Second thoughts are ever wiser.
Leave no stone unturned.
Toil is the sire of fame.
A bad beginning makes a bad ending.
Waste not fresh tears over old griefs.
Man's best possession is a sympathetic wife.
The gods visit the sins of the fathers upon the children.
The gifts of a bad man bring no good with them.
My tongue took an oath, but my mind is unsworn.

SAID OF EURIPIDES.

Euripides stands pre-eminent in true natural expression of the passions in interesting situations, original groupings of character, and varied knowledge of human nature.—*Americana.*

Our Euripides, the Human,
With his droppings of warm tears,
And his touches of things common,
Till they rose to touch the spheres.
—Browning.

Europa. See CADMUS.

EUROPE

Europe, from *Ereb,* "land of the setting sun," is the smallest of the continents, with the exception of Australia; but it has played the largest part in the world history of the last two thousand years. Geographically, Europe is a great peninsula running out from Asia. It has a total area of 3,754,282 square miles, and its coast line is so irregular that its entire length is about 48,000 miles. On the north it is bounded by the Arctic Ocean; on the east by the Caspian Sea, the Ural River and the Ural Mountains; on the south by the Black Sea, the Mediterranean Sea and the Causasus Mountains; and by the Atlantic Ocean on the west.

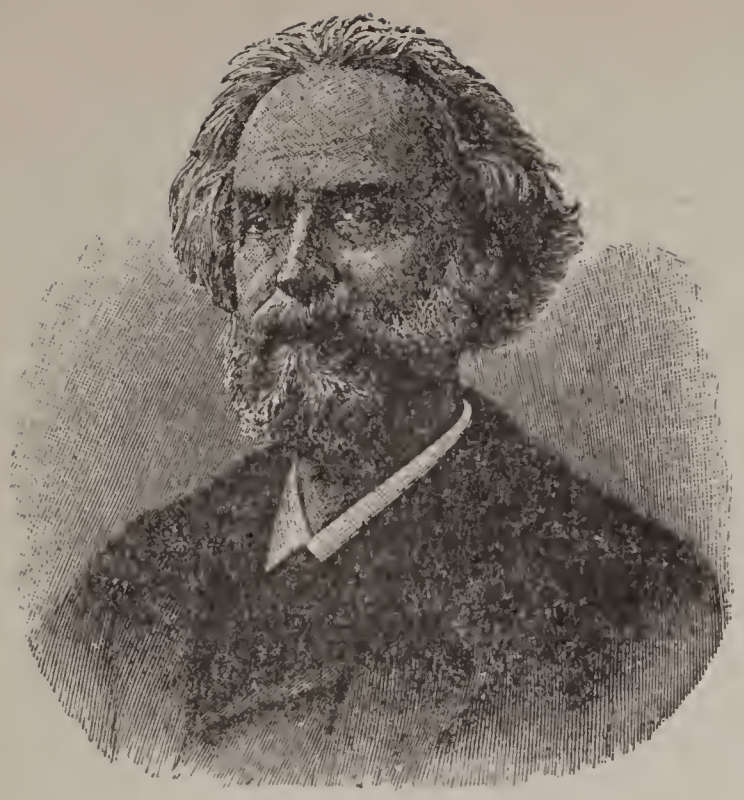
The point farthest north on the European mainland is North Cape, 71° 11′ north, while the southernmost limit is Cape Tarifa, Spain, which is 36° north. From Cape de Roca, Portugal, 9° 27′ west, Europe extends eastward to 66° 21′ east. From north to south, the greatest length of Europe is 2,400 miles; from east to west, 3,923. The principal islands are the Ionic and Balearic islands, Corsica, Crete, Sicily, Malta, Sardinia, Great Britain and Ireland, Iceland and Nova Zembla. The chief seas or arms of the ocean are the White Sea, on the north; the North Sea, the Baltic Sea and the English Channel, on the west; the Aegean, the Adriatic, the Sea of Marmora, the Black Sea and the Sea of Azov on the south.

Physical Features. The coast waters of the continent have been and are still of the first importance in the history, political and economic, of Europe, as have also the islands mentioned above. The mountains, plains and valleys are also extremely important. There are two mountain regions in Europe, as in North America; but the general trend of the European highlands is east and west. Of the two mountain systems, the greatest is in the South, extending from Portugal eastward to the Black Sea, with spurs running southward into the peninsulas, as Italy and Greece. All the islands off the southern coast of Europe are outcroppings of this mountain system. The Alps, Balkans, Pyrenees and Appenines are a part of the system, which embraces an area of approximately 800,000 square miles. The greatest peaks are in the Alps. As has often been pointed out, there is not in this region a single great plain or valley in which a numerically great nation might have developed, and the student is presented throughout his reading of history with the spectacle of a dozen little nations, each occupying its valley region and developing in its own way, and not really in close relation until modern times, after the development of means of easy and rapid communication.

Whereas the mountain regions of the south of Europe are sufficiently productive to supply the means of life to millions of people, the mountains of the north, extending from Ireland through Scotland to Norway, Sweden and Finland, were almost denuded during successive glacial epochs, and are therefore unprofitable as agricultural areas. They yield timber and ore, however, and the countries they embrace are surrounded by excellent fishing waters.

Of all Europe, however, the most important part is the lowland region that extends eastward from the Atlantic Ocean to the eastern boundary, embracing almost all of England, Holland, Belgium, France, Germany, Austria, Hungary, Denmark and Russia. Here is the great agricultural region; here the manufacturing industries have developed; and here have grown up those European nations that have made history since the fall of the Roman Empire.

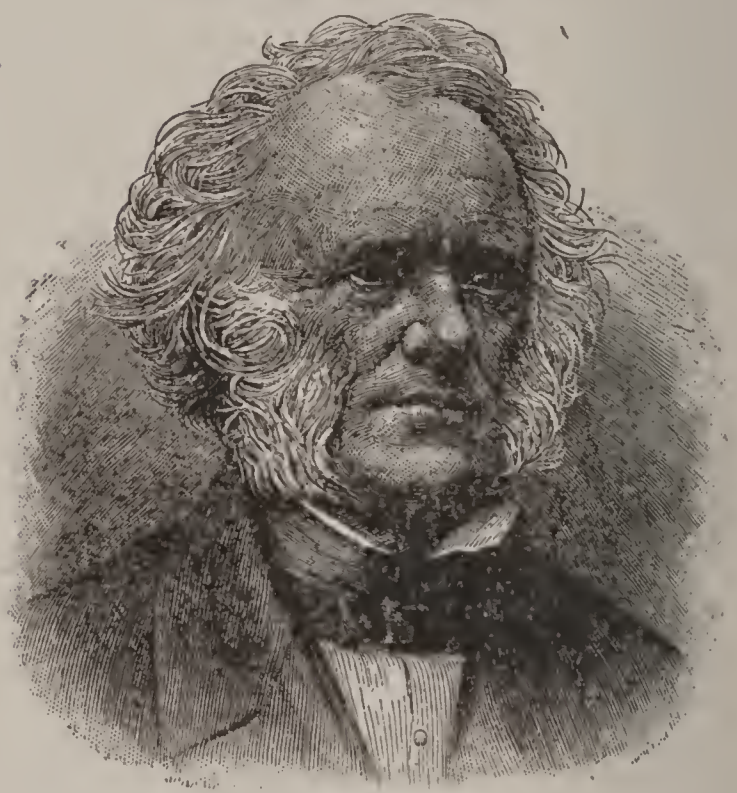
Waterways. The main European watershed runs sinuously from the southwest to the northeast. Three important rivers, the Rhine, the Po and the Rhone, rise in the Alps, while from the Black Forest, north of the Alps, issues a greater river—the Danube. The longest river in Europe, the Volga, 2,400 miles in length, flows down through Russia to the Caspian Sea. The Ebro, Po and Rhone empty into the Mediterranean; the Don, Dnieper, Dniester and Danube pour their waters into the Black Sea; into the Atlantic flow the Guadalquivir, Tagus and Loire; into the English Channel, the Seine; the Elbe and the Rhine into the North Sea; the



Elisée Reclus.

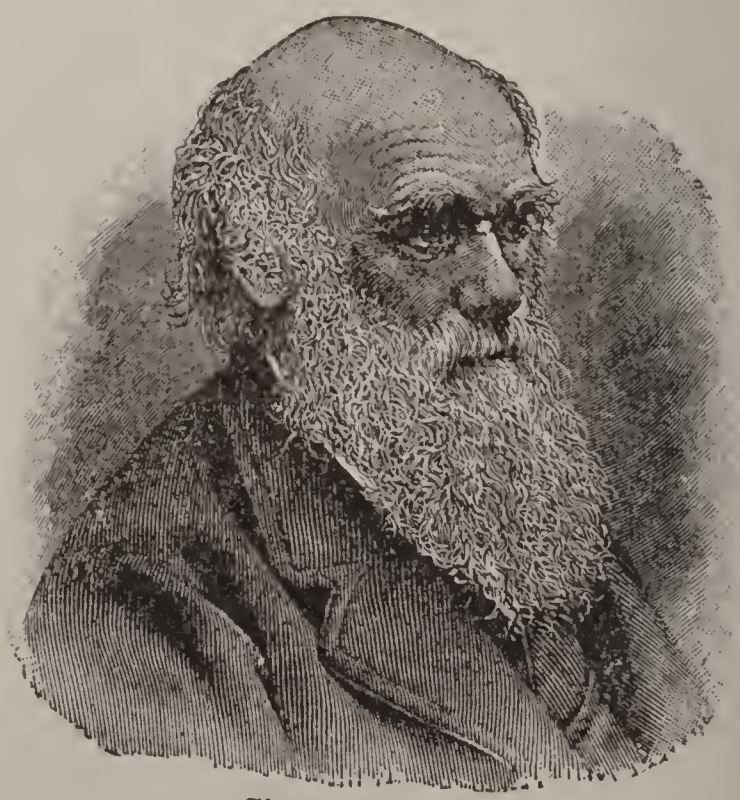
Alexander von Humboldt.

Carl Ritter.



Sir Charles Lyell.

Ernst Haeckel.



Charles Darwin.

EUROPEAN SCIENTISTS.

Vistula, Oder and Duna into the Baltic; and the Dwina into the Arctic Ocean. Thousands of miles of these rivers are navigable, and their names occur on every page of European history. European lakes are numerous; the two largest—Ladoga and Onega—are in Russia.

Climate and Vegetation. Its extensive marine boundary and its position almost wholly within the temperate zone combine to give Europe, in the main, a genial climate. Extremes are encountered, north and south, especially in Russia, but otherwise the climate is more equable than is that of North America. There are no desert areas in Europe, and in general the rainfall is sufficient for the needs of agriculture.

Save in the near-desert region of Russia, productive of grass only, trees and flowering plants are found almost everywhere on the continent. The vegetation is divided into four fairly well-defined zones. In the north are the conifers—spruce, fir and pine, and succeeding them are oak and beech. The chestnut and vine region follows next, but it produces oak also. In the extreme south such sub-tropical trees as the olive and orange flourish. In the same zones from north to south are grown, in the first, barley and wheat; next, wheat, rye and oats; next, these cereals and potatoes; and in the south, all these and rice.

Animals. The advance of civilization has almost exterminated large wild animals in Europe, though the bear, reindeer, wild boar, wolf and lynx are still occasionally found; smaller animals include the fox, marten, ermine, civet, squirrel and rabbit. The most common birds are finches, thrushes, linnets, magpies, canaries, eagles, falcons, buntings, storks and ravens.

Minerals. Europe is abundantly supplied with the two essentials of manufacture—coal and iron; and besides these there are valuable deposits of salt, gold, lead, zinc, tin, potash, copper and petroleum. Building stone, fire clay and marble are also found.

Political Divisions. Before the World War, there were twenty-six states in Europe, one-half of which were kingdoms. There are now forty-two states, the greater number of them republics.

Inhabitants. In the sense that there are Africans and Asiatics, there are no Europeans. The progenitors of modern Europeans came, in all likelihood, from Asia when the human race was young. The oldest civilized inhabitants of Europe are the Greeks. Broadly, the people of Europe belong to the Caucasian and the Mongolian races, in the proportion of nineteen to one. The Caucasians differ greatly among themselves in language, culture and physical appearance. About sixty languages are spoken by all Europeans, including the Mongolians. The Mongolian peoples of Europe are the Finns, Turks, Hungarians (Magyars) and Bulgarians, all characterized by the coppery skin, straight, black hair and high-boned, wide faces that distinguish all Mongolians. Population of Europe, 1922, 445,137,050.

History. Dated European history begins at about 780 B. C., in Greece. Three hundred and fifty years later, Greece was at the height of her power; and with her decline came the accession of Rome. At the opening of the present era, Rome had mastered Greece, Gaul, Helvetia, Spain, Illyria, Dacia, and Germany between the Danube and the Alps. Rome spread her political and artistic ideas throughout southern Europe, and gave Christianity to those she conquered. With the decline of the empire, successive waves of barbarians swept down from the north; Italy was peopled by the Lombards and Ostrogoths, France by the Franks, Spain by the Visigoths, and south Britain by the Angles and Saxons. For the most part, these invaders merged and became one with the peoples of the conquered lands. A great Germanic empire was welded together by Charlemagne (771-814), and about the time of the decline of this empire, the Slavic people of the north began to found kingdoms—as in Bohemia, Russia, Poland—and to exert a great influence in European affairs. To the present Hungary came the Magyars, and to southwestern Europe came the Normans. The Ottoman power grew until Europe reacted against

it, the hostility taking the form of the Crusades. The Turk took Constantinople in 1453, driving the learned men of that city westward. The discovery of America exerted a profound influence on the whole of Europe; as did the French Revolution; the Napoleonic Wars; the unification of Italy under Victor Emmanuel; the Franco-German War; the Turko-Greek War of 1897; the Spanish American War; the Anglo-Boer War; the Russo-Japanese War; the Turko-Italian War; the Balkan War; and, greatest of all, the World War.

Eurydice. See ORPHEUS.

Euterpe, ū-ter′pē, in Grecian mythology, one of the nine muses. She presided over lyric poetry and music, especially wind instruments. She is represented in art crowned with flowers and with a flute in her hand. See MUSES.

Euxine. See BLACK SEA.

Evangelical Alliance, an international association of members of different branches of the Protestant Church, organized in London in 1846 to spread evangelical doctrines and to work for religious liberty and unity. The organization has branches throughout the world, the movement being especially strong in the United States, where it was started in 1867. Much has been done by its members towards promoting religious liberty in such countries as Russia, Turkey and Japan. International conferences are held at intervals of two to four years.

Evangelical Association, a denomination the members of which are largely German-born citizens of the United States. It is similar in its doctrines to the Methodist Church. Recent statistics show the organization to have 154,564 communicants, 1,697 churches, 1,160 ministers, and 198,435 Sunday School students. In addition there are 1,148 societies of the Young People's Alliance, with an enrollment of 39,718. A great deal of missionary work is done by the Association, especially among the Italian population. Effective work has been done also in foreign countries, notably in China and Japan. Besides the *Evangelical Herald* and the *Evangelical Messenger,* the Association sends out printed matter in both the English and German languages. Hospitals are maintained in Chicago, Philadelphia and other cities; also several educational institutions in the United States, and a seminary for preachers in Germany. The main offices are at Cleveland, Ohio.

Evangeline, a poem by Longfellow published in 1847. This was Longfellow's first long narrative poem, and he was exceptionally fortunate in the theme, the beauty and pathos of the story in its idyllic setting being peculiarly suited to his tastes. It is a story of the expulsion from Nova Scotia of the Acadians which occurred in 1786, by order of George III. In Longfellow's story the event takes place on Evangeline's wedding day. She is separated from Gabriel, and the two spend their lives in searching for each other. *Evangeline* was always the author's favorite among his own poems. The material for the poem was furnished by Hawthorne and his friend, Rev. H. L. Conolly. Hawthorne had considered it for a novel, but gladly gave up to the subject to Longfellow and took great delight in the finished poem, rejoicing in the fame it won. It is interesting to note that Whittier had also planned to write a poem on this subject.

Evans, Mary Ann. See CROSS, MRS. MARY ANN EVANS.

Evans, Robley Dunglison (1846-1921), an American naval officer, popularly known as "Fighting Bob" Evans. He was born in Floyd Co., Va., and was graduated from the United States Naval Academy in 1863. He served in the West Indies and was with the North Atlantic squadron in both attacks on Fort Fisher, and in the second was severely wounded. Evans was commissioned lieutenant-commander in 1868, and commander in 1878. He was in command of the *Yorktown* at Valparaiso, Chile, where American sailors were killed by a Chilean mob. Here, during the absence of the *Baltimore,* Evans faced with his single gunboat the entire Chilean squadron and won the sobriquet of "Fighting Bob." During the war with Spain he commanded the *Iowa* and took a prominent part in the battle of Santiago. It was on his recommendation

that American battleships were first built of steel. When the American fleet left Hampton Roads in 1907 Rear-Admiral Evans was in command. But when the fleet reached San Francisco ill health forced him to resign. In 1908 he was retired, with the thanks of the Navy Department.

Evansville, the county-seat of Vanderburg County, Indiana, and a river port on the Ohio. Seven railroads enter the city, as well as four traction lines, and it carries on an extensive trade in hardwood, wheat, corn, flour, coal, and tobacco. There are thriving manufactories, among them foundries, planing mills, flour mills, machine shops, cotton and woolen mills, breweries, furniture factories, and plow factories. It has an extensive river traffic. The government buildings are noteworthy, including a customs-house and a United States Marine Hospital. A State Hospital for the Insane is located there, two Carnegie libraries, and the Willard Library and Art Gallery. The public schools are known for their excellence. The city has several fine parks. Its population in 1920 was 85,264.

Evaporation, the changing of a liquid or a solid into a vapor at a temperature below the boiling point. It is well illustrated by the constant passage of water into the air from the surface of all the seas, lakes, rivers, and ponds on the earth. The rate of evaporation from a given surface is dependent upon a number of circumstances, notably, the temperature, the pressure of the air and the degree of saturation of the atmosphere. In order to induce a rapid evaporation at a low temperature, a shallow vessel of water may be placed under the receiver of an air-pump and the air removed. A little sulphuric acid may be used to absorb the moisture. As the pressure is reduced, evaporation becomes very rapid, and the accompanying lowering of temperature may be sufficient to even freeze the water. The evaporation is often rapid enough to present all the appearances of boiling so the water may be said to "boil till it freezes."

Evaporation is explainable by the kinetic theory. Also the loss of the most rapidly moving particles reduces the average velocity of the molecules, and hence the temperature. The lowest temperature thus far reached has been produced by the evaporation of liquid hydrogen in a vacuum.

Evarts, William Maxwell (1818-1901), an eminent American lawyer and statesman. He was born in Boston, the son of Jeremiah Evarts, a lawyer and editor. He graduated at Yale in 1837, studied for a year in the Harvard Law School, and in 1841 was admitted to the bar in New York. Later he became head of the famous law firm of Evarts, Choate and Beaman. As a lawyer he had a very brilliant career, acting as counsel in a number of celebrated cases. In 1857 he became United States District Attorney for New York. President Johnson owed his acquittal largely to the efforts of Mr. Evarts, who acted as his counsel. He served as attorney-general in 1868 and 1869, and during President Hayes' administration was secretary of state. In 1891 he retired from public life after a term in the United States Senate. During his political career he was sent on various important embassies by the government, one service he rendered being chief counsel of the United States before the Geneva tribunal on the matter of the Alabama Claims. As an orator Evarts stands pre-eminent, his best-known public addresses being the Centennial oration at Philadelphia in 1876 and his address at the unveiling of Bartholdi's Statue of Liberty.

Eve of St. Agnes, The, a poem by John Keats, published in 1820. The poem is based on an old tradition relative to the eve of St. Agnes. St. Agnes was a Roman maiden who, during the age of Diocletian, when she was only thirteen years of age, suffered martyrdom. January 21st is celebrated in her honor in Greek, Roman, and Anglican churches. The night of January 20th came to be regarded as a special holiday for women, and the tradition on which Keats founded the story of his poem is that, by observsing certain ceremonies, a maiden might on that night get a glimpse of her future husband. The poem consists of forty-two stanzas of nine lines each. It is, perhaps, the best known of Keat's poems, and also one of the most beautiful.

Few poets have succeeded in creating an atmosphere so dreamy, so enchanted, so full of beauty, so removed from the common world of our every day experiences.—Gayley and Young.

Everest, Mount, the highest known mountain in the world. It is situated in the central Himalayas. It reaches to a height of 29,002 feet or five and one-half miles. It was named for the English engineer, Sir George Everest, who conducted the great trigonometrical survey of India. In 1922 the record height of 27,300 feet was attained by two members of the British expedition that took the field in 1921 for the purpose of reaching the summit of the mountain. During this climb it was learned, among other interesting things, that man can live at higher altitudes than was heretofore supposed, since the greater part of the record climb was made without the use of stored oxygen. See TIBET; HIMALAYAS.

Everett, Edward (1794-1865), an American orator and statesman. He was a native of Boston and was educated at Harvard University. He entered the Unitarian ministry, and afterward studied abroad to fit himself for a professorship of Greek literature in Harvard. Through the editorship of the *North American Review,* which he filled ably for a few years, he gained an introduction to public life. He served in Congress, both as a representative and senator, was three times governor of Massachusetts, went to England as minister plenipotentiary, acted as president of Harvard College from 1845-9, and was secretary of state in the cabinet of President Fillmore. Edward Everett was a noted orator. At the dedication of the Gettysburg Monument he delivered the address of the day. He is credited with saying that his elaborate address would be forgotten, but that the words spoken by Abraham Lincoln on that occasion would live forever. His public addresses and speeches were published in 1892 in four volumes.

How different the grains of our Atlantic gold, sown by the prudent hand of man, in this kindly alternation of seed-time and harvest; each curiously, mysteriously organized; hard, horny, seeming lifeless on the outside, but wrapping up in the interior a seminal germ, a living principle! Drop a grain of California gold into the ground, and there it will lie unchanged to the end of time, the clods on which it falls not more cold and lifeless. Drop a grain of our gold, of our blessed gold, into the ground, and lo! a mystery. In a few days it softens, it swells, it shoots upward, it is a living thing.

It is yellow itself, but it sends up a delicate spire, which comes peeping, emerald green, through the soil; it expands to a vigorous stalk; revels in the air and sunshine; arrays itself, more glorious than Solomon, in its broad, fluttering, leafy robes, whose sound, as the west wind whispers through them, falls as pleasantly on the husbandman's ear as the rustle of his sweetheart's garment; still towers aloft, spins its verdant skeins of vegetable floss, displays its dancing tassels, surcharged with fertilizing dust, and at last ripens into two or three magnificent batons like this (an ear of Indian corn), each of which is studded with hundreds of grains of gold, every one possessing the same wonderful properties as the parent grain, every one instinct with the same marvelous reproductive powers.

Everett, Mass., a city of Middlesex County, 3 miles north of Boston, on the Boston & Maine and the Boston & Albany railroads. It is a residential suburb of Boston. Its manufactures are important and include chemicals, coke, cans, oils and gasoline, paints, iron products, structural steel, bricks and shoes. There are banks, libraries and hospitals in the city, a high-pressure water service, auto fire apparatus, and one of the best school systems in the state. Everett is an enterprising community and is rapidly becoming an important industrial center. It is connected by interurban lines with Chelsea, Lynn, Salem, Malden and other cities. It was settled in 1630. Population, 1920, 40,120.

Everett, Wash., is thirty miles north of Seattle, on Puget Sound, and on the Northern Pacific, the Great Northern and the Chicago, Milwaukee & St. Paul railroads. It is the county seat of Snohomish County. It has a fine harbor and several large iron piers. The city trades extensively in lumber. Some of the largest lumber mills in the Northwest are here, and red-cedar shingles are an especially important product. An extensive paper manufacturing plant is located near the city. United States customs offices are located here. The city contains an armory, a Y. W. C. A. and a Carnegie library. The population in 1920 was 27,614.

Everglades, a marshy district in the

southern part of Florida. It is from 10 to 60 miles in width and about 160 miles in length. It is for the most part a vast, grassy solitude, overflowed by water, with here and there dry hummocks varying from a few feet to a mile in extent, covered with jungles of palmetto, shrubs, and tangled vines. Long stretches of cypress swamps separate the Everglades from the sea. This region was the refuge of the Seminoles during the last struggle before their removal to Indian Territory. Fish are abundant in the sluggish streams. Deer and other game are still found in the jungles, as in the case of the great Dismal Swamp. An effort has been made, with some success, to reclaim the region for agricultural purposes. It is covered with decayed vegetation to the depth of several feet, and one day will be, no doubt, a veritable garden spot. See FLORIDA; DEER.

Evergreens. See CONIFERS.

Evidence, in law, those things that are introduced into a legal trial, whether civil or criminal, to prove the truth or falsity of the contentions of each party involved. A fairly sharp distinction is made between testimony and evidence, and between direct and positive, and presumptive and circumstantial evidence. Testimony is the name applied to oral or written statements, which, it will be seen, are not likely to be as positive as are objects which may be inspected by the judge and the jury.

Arguments by the attorneys for the persons involved in a trial as to what evidence may be introduced in the court often take up a great part of the total time of a trial, and are caused by the rule that says only such evidence as has a direct bearing on the case is admissible. The strict application of this rule not infrequently gives rise to peculiar situations, for if it be charged that a person stole a watch, evidence that he stole a motor car will be considered irrelevant.

Hearsay evidence has less weight in a court than has oral evidence, while the latter is not as weighty as documentary evidence usually is. Prima-facie evidence is that evidence which, though appearing conclusive at first, may later be contradicted. Circumstantial evidence is that evidence which, while strongly indicating a crime, does not actually prove that the crime was committed. Circumstantial evidence, however, sometimes is sufficient to secure a conviction.

Evolution. See DARWIN.

Excalibur, in British legend, the wonderful sword of King Arthur, whose

> Haft twinkled with diamond sparks,
> Myriads of topaz-lights, and jacinth-work
> Of subtlest jewelry.

In Malory's *History of King Arthur,* Excalibur is miraculously imbedded in a rock at the church door. Whoever is able to withdraw it is to be king. Two hundred nobles try to draw out the sword and fail. Arthur, who is but a boy at this time, knows nothing of the matter. He is sent one day by his foster brother to get a sword for his use. Arthur remembers having seen the sword in the stone by the church door, so he rides there to get it, and draws it forth easily. In consequence Arthur is made king. The sword was reputed to have a scabbard belonging to it which would guard its wearer from losing blood. In his *Idylls of the King,* Tennyson tells another legend—also mentioned in Malory's account—to the effect that the Lady of the Lake gave Arthur the sword. Bellicent, Queen of Orkney, tells Leodogran:—

> There likewise I beheld Excalibur
> Before him at his crowning borne, the sword
> That rose from out the bosom of the lake,
> And Arthur row'd across and took it—rich
> With jewels, elfin Urim, on the hilt,
> Bewildering heart and eye—the blade so bright
> That men are blinded by it—on one side,
> Graven in the oldest tongue of all this world,
> "Take me," but turn the blade and ye shall see,
> And written in the speech ye speak yourself,
> "Cast me away!" And sad was Arthur's face
> Taking it, but old Merlin counsell'd him,
> "Take thou and strike! the time to cast away
> Is yet far-off." So this great brand the king
> Took, and by this will beat his foemen down.

After he is wounded in the "last great battle of the west," he commands Sir Bedivere to fling the sword into the middle of the lake. Twice Bedivere fails, since the wonder and beauty of the sword impel him to keep it. At the third command he obeys, when a hand appearing out of the water grasps the sword and disappears.

Then quickly rose Sir Bedivere and ran,
And, leaping down the ridges lightly, plunged
Among the bulrush beds and clutch'd the sword,
And strongly wheel'd and threw it. The great brand
Made lightnings in the splendour of the moon,
And flashing round and round, and whirl'd in an arch,
Shot like a streamer of the northern morn,
Seen where the moving isles of winter shock
By night, with noises of the Northern Sea.
So flash'd and fell the brand Excalibur;
But ere he dipt the surface, rose an arm
Clothed in white samite, mystic, wonderful,
And caught him by the hilt, and brandish'd him
Three times, and drew him under in the mere.

Excelsior State. See NEW YORK.

Exchange, in commerce, those transactions by which persons who reside at a distance from each other discharge their debts without the transmission of specie. This is done by a written order called a draft, or bill of exchange. If a merchant in San Francisco owes $1,000 to a business house in New Orleans, he gives an order for that amount, which is cancelled through a banking agency, or otherwise, by the similar payment of a debt owed by a New Orleans merchant to a business house in San Francisco. This manner of cancelling debts excludes the risks and expense incurred in transmitting money.

International exchange is carried on in the same fashion. Exchange is said to be "at par" when a bill drawn in New York for the payment of £100 sterling in London can be purchased in London for exactly that amount. The exchange is said to be "below par" when the bill can be had there for less than £100 sterling, and "above par" when more than that amount is necessary for its purchase. Ordinarily, the amount of fluctuation above or below par in foreign exchange is inconsiderable. See STOCK EXCHANGE.

Exchequer, in Great Britain the governmental department that handles the moneys received and paid for the purpose of the public service. The public revenues are paid into the Bank of England, to account of the exchequer; these receipts and the payments for the public service are under the supervision of the Controller and Auditor-General. The incumbent must be a member of the House of Commons.

Excise Tax. See INTERNAL REVENUE.

Executive Department, that governmental department charged with the duties of carrying the laws of a country into effect, and thus distinguished from the legislative department, which makes the laws, and the judicial department, which interprets them. The executive department always includes the highest official, whether he be president, king, emperor or governor, together with his cabinet and many lesser officials.

In the United States, though their existence is not recognized by the Constitution, the secretaries of the various narrower governmental departments—State, Labor, etc.—together with the Postmaster-General and the Attorney-General are commonly called chiefs of executive departments.

Executor (Latin, performer), according to Blackstone's Commentaries, one to whom another commits his last will and testament, and to whom the testator entrusts the execution of such will and testament and codicils, if any. The duties of the office of executor are many and varied. Among them, if no other provision has been made in the will, are his looking after the funeral and matters connected therewith, and giving notice of his appointment according to law; and his collecting and enumerating, within a reasonable time, the properties of the deceased. He must make an inventory of real and personal property; deal with the personal effects as set forth in the will; pay debts and legacies; and be ready at all times to file a correct itemized report of his acts and doings under the will, until his final discharge by the court.

Exeter, a city, river port and parliamentary and municipal borough of England, is in the County of Devon, on the bank of the Exe, 10 miles northwest of its outlet in the English Channel. It is a city of fine squares, terraces and streets, and is situated on an acclivity which rises from the river.

Two points of interest here are a cathedral built in 1112, and the remains of an old historic castle, Rougemont. Among the public buildings are the Albert Memo-

rial Museum and the Guildhall. There are also several fine churches. The chief industries are the manufacture of iron products, agricultural implements and paper. An especially beautiful Honiton lace is made here.

Exeter dates back to antiquity, since it was settled by the English long before the invasion of the Romans. Population, 59,608.

Exmoor, a wild, windy, mostly wooded region on the border line between Somerset and Devon, England. It is covered with heath, and contains many bogs concealed by a growth of the wild juniper and cranberry. Exmoor Forest was one of the strongholds of the ancient Druids. It is bordered by dark, precipitous glens. An excellent idea of this region may be had from Blackmore's *Lorna Doone* and Conan Doyle's *Micah Clarke.* See LORNA DOONE.

Exodus, the second book of the Old Testament, relates the story of the departure of the Israelites from Egypt to their promised land of Canaan. The contents of the book are partly historical and partly legislative, describing the events connected with the promulgating of the Sinaitic law. Other interesting reading is the story of Moses—his birth, youth and deeds—the establishment of the Covenant with Yahwe and laws incidental thereto, the construction of the tabernacle, and the sin of the golden calf.

Expansion, an increase in volume due to the action of heat. Theoretically, at least, heat causes the molecules of a substance to move to and fro with great energy, and jostle each other farther apart. If, for instance, a bar of iron be measured at a freezing temperature, and again in boiling water, it will be found to have increased sensibly in length. In case of an iron rail or bridge truss 1,000 feet in length this gain amounts to over one foot. Wrought iron and steel expand a little faster than cast iron. If we let the number 11 represent the expansion of cast iron under certain conditions, that of glass is represented by 7; platinum, 8; steel and wrought iron, 12; gold, 15; copper, 17; brass and silver, 19; tin, 22; lead and zinc, 29. It is but fair to say that these values differ according to the author consulted. A gain in length is, of course, accompanied by an increase in surface and in volume. The increase in surface may be represented by the square of the increase in length; that of volume by the cube. The expansion of mercury is about ten times that of silver, copper, or brass; that of olive oil and turpentine is .00080; platinum, .000008. The expansion of turpentine and olive oil is therefore about 100 times as great as that of platinum.

It has been ascertained that the rate of expansion for the important gases is practically the same. Starting with the volume at the freezing point, 0° C. or 32° F., it is found that air, oxygen, hydrogen, nitrogen, and other standard gases gain 1/273 of their volume for every increase of 1° C. in temperature, and 1/490 for every increase of 1° F. According to this statement, an increase of 273° C. doubles the volume of a gas. Starting at the freezing point again, it is found that gases lose correspondingly in volume with a loss of temperature. Theoretically a gas would lose its entire volume, that is, be extinguished, if its temperature were reduced 273° C. below the freezing point. This theoretical temperature at which a gas would go out of existence is called an absolute zero.

Mechanics and engineers make allowance for expansion. Railroad irons are laid with open joints to prevent the bulging of rails. The same allowance is made in the construction of iron bridge trusses. The walls of a bulging building may be brought together by large rods passing through them from side to side. If the centers of these rods be heated and the expansion taken up by nuts on the outside ends, a physical cooling and contracting of the rods will bring the building together powerfully. Wagon makers heat tires over circular fires of burning chips and put them on the wheels while hot. The tire contracts in cooling and becomes tight.

The following table gives the increase in volume of various building material if heated from 32° to 212° F. or from 0° to 100° C. The decimal indicates such a

part of the volume at a freezing temperature.

Brass	.00187	Dry earth	.00035
Copper	.00170	Brick	.00355
Cast iron	.00112	Marble	.00065
Steel	.00109	Sandstone	.00090
Lead	.00290	Terra cotta	.00045

Expansion and contraction, due to heating and cooling, does much to convert rock into soil. Water entering the surface and crevices of rock in the summer time is frozen in winter and in expanding not only acts like a wedge, opening vast crevices in the rock, but it also splits off little particles. Experiments with a block of granite one hundred feet long have shown that, if the temperature be increased 150°, the length of the block will be increased three-fourths of an inch.

Where enormous areas of granite lie exposed to the sun, this expansion can only take place in an upward direction. Explorers in northern Labrador, where such exposures are frequent, report that hundreds of acres of granite rock are covered by flakes of stone. In many places the granite surface is covered by sheets of coarse granite about as thick as a pane of glass. The effects of expansion and contraction are, of course, greatest in a country like Labrador, where an extremely cold winter is succeeded by the blistering heat of a short but intense summer.

Experiment Stations, a system of experimental college farms. The general government of the United States maintains a station for agricultural experiments in every state and territory of the Union. Specialists are furnished land, buildings, tools, stock, and labor to try new crops, new methods, and to make improvements in the old. Fruits, vegetables and field crops, bees, poultry, horses, horned cattle, swine and sheep, dairy products, and household economy, all receive attention. A school of instruction, or agricultural college, is maintained usually in connection with the experiment station. The possibilities of such stations are limited only by the ability and originality of those in charge. By act of Congress, bulletins may be sent out, postage free, which is now done to the extent of over half a million addresses. Some of the states maintain additional stations.

The Dominion of Canada maintains a central experimental farm at Ottawa, with about twenty branches in the various provinces and many sub-stations, test farms, etc.; there is also an important station at the Agricultural College of Guelph, Ont. In England and Scotland a system of agricultural research institutes has been developed by government grants to existing institutions. Germany had over 100 experiment stations prior to the great war; France has about 100 stations and laboratories, and practically every other European country now conducts agricultural research at stations maintained or assisted by government funds. Experimental and demonstration work is also under way in most Latin-American countries, and similar work is done at stations organized in recent years in Japan, China, the Philippines, South Africa, India and the British West Indies. Australia and New Zealand have about 60 experiment stations, and a station was established a few years ago by American Jews at Haifa, Palestine. The total number of stations in the world is about 1,000.

Of the 65 experiment stations in the United States at last report, forty-eight were studying different methods of feeding and breeding animals; thirty-four were investigating subjects relating to dairying, including the chemistry and bacteriology of milk and cream, butter-making or the construction and management of creameries; forty-one were investigating soils, their geology, physics and chemistry; eighteen were studying questions relating to drainage and seepage, or to irrigation in the field or greenhouse, and also irrigation of orchard, garden or farm crops; and twenty-four were doing work with poultry. All the stations are engaged in studying the more important crops, either with regard to their composition, nutritive value, methods of manuring and cultivating, and the best varieties adapted to individual localities, or with reference to the most desirable systems of rotating crops in various soils, etc. All these stations are united in a national system through the

Association of American Agricultural Colleges and Experimental Stations and the bureau of experiment stations in the United States Department of Agriculture. This bureau also manages stations in Alaska, Hawaii, Porto Rico and Guam. Most of the stations keep meteorological records and issue bulletins regarding climatic conditions in their respective localities. The bulletin service is of immense value to farmers, gardeners and orchardists.

Explosives, the general term applied to substances by whose decomposition or combustion gas is generated with such rapidity that they can be used for blasting or kindred purposes in peace and war, or as a means of propulsion in firearms. Of these substances, gunpowder, often called simply powder, is by far the best known and has been in use for centuries. Guncotton, nitroglycerin, and various other compounds of tremendous explosive force, are among those more recently introduced. The principal explosive agents used for military purposes, besides black and smokeless gunpowder, are guncotton, dynamite, nitroglycerin, TNT and the various fulminates. Those which are quicker or more powerful in their action than gunpowder (which see) are called high explosives.

Explosives are classed as mechanical mixtures or chemical compounds. The first kind consist of certain chemical substances which are intimately mixed by mechanical means, and at an increased temperature react upon each other and pass into the gaseous state, causing the explosion. Gunpowder is typical of this class, and another is a mixture of finely divided charcoal and liquid air. Nitroglycerine is typical of the second class, which also includes guncotton, trinitrotoluol (TNT) and mercury fulminate. Low explosives are fired by ignition, and high explosives by detonation. In the latter case, the combustion of the explosive substance is caused nearly simultaneously throughout the entire mass. An explosion of either kind may be defined as a chemical reaction which is effected in an exceedingly short space of time, with the evolution of a large quantity of gas and accompanied by a shock. When this reaction occurs within a confined space, as in a shell fired from a gun, the expansive action of the heated gases produces shattering effects.

In the present day man uses the energy of chemical action to send a projectile to any desired point, which may be many miles away. Thus during the World War, German projectiles were fired into Paris from a distance of over seventy miles and their bursting charges were tremendously destructive when the projectiles struck their objective. The element used almost universally in military explosives for destructive purposes is nitrogen, the same element which is absolutely essential for any form of animal or plant life. Compounds of this element must be present in our food and in the soil in which our food grows, and yet many of our most violent poisons are compounds of this same element, and other nitrogen compounds form the most destructive of all the materials of warfare.

Smokeless powder and similar products are explosive chemical compounds or mixtures made by treating various organic materials with a mixture of nitric and sulphuric acids, great care being necessary both in the selection and purification of materials and in the processes of manufacture. Nitroglycerin, discovered by Sobero, an Italian, in 1847, is prepared by spraying glycerin into a mixture of nitric and sulphuric acids, which must be kept cold. The compound is a heavy, pale yellow oil, very poisonous and very easily exploded by a shock. It was little used until 1866, when Sir Alfred Nobel, of Sweden, founder of the Nobel peace prize, prepared dynamite by the absorption of nitroglycerin in sawdust, infusorial earth, or some similar substance. In this form it can be handled with much greater safety.

Nitrocellulose, another high explosive, is prepared by treating carefully prepared cellulose with a mixture of nitric and sulphuric acids. This cellulose is generally obtained from cotton of short fiber, purified by special processes, although wood cellulose can also be used. Under the name of gun cotton, this is extensively used

and is considered one of the safest of modern explosives.

Certain coal-tar products when treated with nitric and sulphuric acids also yield highly explosive compounds, which have been extensively used in recent years. These differ in their chemical composition from the compounds already mentioned, and contain the "benzene ring" found in practically all coal-tar products. Picric acid and TNT are the most important of these explosives. During the war period there was a great output of these compounds in the United States.

Primers and detonators, used in artillery to produce the initial shock for the explosion of the main charge, also rank among high explosives. Mercury fulminate, a typical substance, is made from mercuric nitrate, nitric acid, and alcohol.

Explosives have a decided value in industry, being largely used for constructive as well as destructive purposes. The most recent development of high explosives has been turned to good account in the building of roads and waterways, railways and tunnels, so that the equipment acquired by the United States for their manufacture is proving profitable. New uses for explosives are being found, and among these are the shattering of ground for planting fruit trees and in other forms of agricultural work. In practically all large explosive plants, sulphuric acid has been manufactured, and this acid has numerous industrial uses; while the fixation of atmospheric nitrogen, carried out in the manufacture of war explosives on a tremendous scale, can be of the greatest practical value in the manufacture of fertilizers.

Exports, commodities or productions shipped out of a state or country. Commodities shipped in are called imports. The interchange of exports and imports is treated of under the head of COMMERCE.

Exposition, a vast show of natural products and the productions of industry and art. The idea is an outgrowth of the commercial fairs of Asia and Europe. The idea of a modern exposition originated with the French. An exhibition of manufactures was held in Paris in 1798. The results justified a second show in 1802. The idea was then taken up by other countries. The first great English exposition or World's Fair was held at London in 1851. An enormous edifice, popularly known as the Crystal Palace, being constructetd largely of glass, was erected in Hyde Park. It covered an area of nearly nineteen acres. There were 15,000 exhibitors from all parts of the world, and over 6,000,000 visitors. The gate receipts came within $1,000,000 of defraying the entire expense. In 1855 the great Exposition Universelle was opened at Paris. It exceeded in every way that held in London. From this time on, large expositions were held with increasing frequency. Large exhibitions were held in Paris in 1867, 1878, 1889, and 1899. The latter was visited by between 45,000,000 and 50,000,000 people. The first great exposition in America was the Centennial, held in Fairmont Park.

One of the greatest expositions of recent years was the Centennial Exposition held at Rio de Janeiro, Brazil, in 1922. The primary purpose of the exposition was to commemorate the centenary of Brazil's independence; the secondary purpose was to acquaint the world with Brazil's vast undeveloped resources. See EIFFEL TOWER; PHILADELPHIA; CENTENNIAL; PAN-AMERICAN; LOUISIANA PURCHASE; BRAZIL.

Ex Post Facto Law, a measure making an act criminal which had not been so before, or a law increasing the punishment for an act previously committed. For example, if a law should be passed forbidding the carrying of concealed weapons, and a man should be punished for having carried such weapons previous to the enactment of the law, it would be an ex post facto law, a law passed after the commission of the deed. The Constitution of the United States expressly forbids the enactment of such a law in any of the states.

Express, a system organized for the rapid and safe transportation of valuable parcels and merchandise for which ordinary freight train methods are too slow. Express companies are organized independently, and pay for the privilege of

conveying expressage on trains and boats engaged in carrying mails and passengers. The first American express of which we have record was advertised by a Mr. Harnden to begin March 4th, 1839, between Boston and New York, by way of the Boston and Providence Railway and Long Island Sound steamboats. On his first trip he carried some bundles of books, booksellers' orders, some brokers' parcels, and bank notes. A year later a competitive line by way of Worcester was established. By 1841 we find Philadelphia, Albany, Baltimore, and Washington included. The plan was extended rapidly. Upon the discovery of gold in California rival companies were organized to compete for the business of carrying gold, supplies, and passengers

For a number of years prior to July 1, 1918, the railway express business of the United States was handled by eight principal express companies, including the Adams, American, National, Northern, Southern, United States, Wells-Fargo and Western express companies. While each of these companies in a general way occupied the territory served by separate railway lines, they were in competition with one or more companies in a portion or perhaps all of their territory. On July 1, 1918, under an order of the Director-General of Railroads, during wartime Federal control of the carriers, the operations of the express companies were merged into one company called the American Railway Express Company. This company operated without railway-express competition until May 1, 1921, on which date the Southeastern Express Co. started operation, its activities being confined principally to the Southern Railway system and allied lines, including the Mobile & Ohio Railroad.

The railway express companies perform a necessary and valuable service to the public. The traffic handled includes highly perishable food supplies, and package freight consisting of the lighter forms of merchandise, as well as emergency shipments of various articles requiring rapid transportation. Tonnage handled by the express companies is transported in passenger-equipped cars and passenger trains or in solid express trains moving on passenger schedules.

In addition to an investment of about $28,000,000 in real estate and equipment, as of October 31, 1921, the American Railway Express Company holds contracts with the several railroads which represent an asset of considerable value. The real estate includes buildings and land used in the conduct of the business for warehouses, stations, stables, garages, and other necessary utilities. The express company uses equipment and station facilities belonging to the railroad companies, but on October 31, 1921, owned 249 refrigerator cars, which are used to move perishables between various sections of the country; and also under its contracts with the railroad companies makes use of refrigerator and other car equipment belonging to the railroads. The company also owned at the above date 17,728 horses, 3,212 automobiles, and 17,943 wagons, sleighs and buggies.

The consolidation of the several express companies into one operating company has resulted in benefit to the shipping public. The wartime situation during the latter part of 1917 and the early part of 1918 was so serious that it threatened that most of the then-existing express companies would be obliged to discontinue operations because of the rapidly increasing costs without a corresponding increase in revenues. From July 1, 1918, to February 29, 1920, the American Railway Express Company operated under an agreement with the Director-General of Railroads by which the express company was guaranteed against loss. Under the provisions of the Transportation Act of 1920, this guarantee against loss was extended to August 31, 1920; but during this entire period the express business was conducted without one dollar of return to the stockholders. Under a new form of contract with the railroads, effective September 1, 1920, the railroads receive the balance of express revenue, after payment of expenses and an agreed return to the express company, and thus, with the saving from unified operation, the American Railway Express Company has been enabled

to continue the service, though with reduced compensation to the railroads.

One of the principal benefits of express consolidation has been the saving in operating expenses, which is estimated at $14,000,000 a year. Up to September 1, 1920, the payments to the railroads were made on a fixed percentage of gross revenue; the balance was retained by the express company out of which to pay its operating expenses for loading and unloading at stations, care in transit, warehouse, and handling from shipper's place of business to express office, and corresponding delivery to consignees, and other operating expenses and taxes. Since the execution of the uniform express contract, the division of revenue has been on the basis of allowing the express company its cost of operation, plus 2½ per cent of the difference between operating expenses and gross revenue, the balance remaining being apportioned among railroads for transportation facilities furnished.

The express company makes delivery direct to stores or houses in practically every city and many towns in the country, covering in all cases the entire business district and frequently portions of the residential districts. In the smaller towns and villages, delivery of express packages must be taken by the consignee at the railroad station.

One of the older express companies, the American Express Co., has retained its money-order business, which has grown to large proportions and is a great public convenience as a means of facilitating the payment of bills and the exchange of money in large and small amounts between various sections of the country. It also transacts an extensive business in the issuance of "travelers' checks" which pass current at home and abroad, and obviate the necessity of carrying large amounts of currency when engaged in travel.

Exterritoriality, in the intercourse of nations, the unwritten law that says a diplomat, no matter where he goes in the service of his country, is always on his native soil. Though not bound by the laws of the country to which he is sent, but by the laws of his own country, a diplomat always scrupulously obeys the law of the land he visits. He cannot be punished for violating a foreign law, but the country he visits may demand of his country that he be recalled.

This peculiar law grew out of the royal custom of visiting early established in Europe. A king could not lawfully set foot outside his dominion, and was therefore under the necessity of contriving some means of staying at home while visiting. The fiction was therefore created that that piece of ground whereon his foot rested was his as long as the foot remained there. And for the reason that a sovereign could not submit to the rule of another country and be prosecuted for a transgression of foreign law, consistency and national pride ruled that the same immunity be extended to the king's ministers who went abroad.

Extradition, the surrender of an alleged criminal by one state or nation to another for trial. American readers are interested in the extradition of fugitives by one state of the Union to another, and extradition between our own country and other countries. The first we may call interstate extradition; the second international extradition. The American colonies were never eager to give asylum to criminals. The New England Confederation of 1643 provided for the return of criminals escaping from one colony to another. The Articles of Confederation made similar provision. The second clause of Section 2 of Article IV of the Constitution runs:

> A person charged in any State with treason, felony, or other crime, who shall flee from justice, and be found in another State, shall, on demand of the executive authority of the State from which he fled, be delivered up, to be removed to the State having jurisdiction of the crime.

The process by which a fugitive from justice is to be delivered up is prescribed by Congressional act of 1793. The accused must first of all be indicted duly in the state where the offense was committed. A warrant is issued, after which the accused has the right of appealing to the courts

for protection. This he does under a writ of habeas corpus. This course requires the arresting officer to produce convincing proof of the prisoner's guilt, or else the court will set the prisoner free. In practice, interstate extradition is not always a simple matter. A crime is an offense made so by law. The laws of the two states may not agree as to what constitutes the crime in question, and, moreover, though the national Constitution commands the governor to deliver the guilty fugitive, it provides no means of coercing a governor to do so. The whole matter falls back, like many other processes at law, largely upon good sense and a desire to do justice. All proper expenses of arrest, confinement, trial, if any, under habeas corpus, and transportation, must be borne by the state making the demand.

There have been notable instances of refusal to extradite. During Dorr's Rebellion Governor Cleveland of Connecticut refused to surrender Dorr to the governor of Rhode Island on the ground that the treason laws of Rhode Island were not valid in Connecticut. Governor Seward of New York refused to surrender fugitives accused of stealing slaves from the slave states to set them free. Seward maintained that it was not contrary to the laws of New York, nor contrary to common law, nor contrary to the usages of civilized nations to set a slave free, and that slave stealing for the purpose of emancipation was not—the United States Constitution to the contrary—an offense warranting extradition. Governor Seward's course, it may be noted, lay dangerously near nullification.

Until recently the surrender of fugitives was a question largely of personal inclination on the part of rulers. Ancient treaties of surrender were not infrequent, but they related chiefly to the surrender of political offenders. A study of these agreements extending back for 3,500 years reveals an anxiety to recover the persons of those who had offended rulers rather than to bring thieves and murderers to justice. As late as 1849 the governments of Russia and Austria suspended diplomatic relations with Turkey, because the sultan refused to surrender revolutionary Poles and Hungarians who had fled to his domains for protection. A very decided change has taken place. The civilized world now holds

1. That political refugees should not be surrendered.
2. That the crime for which fugitives may be given up must be named by treaty.
3. That requisition must be made through diplomatic channels.
4. That the officials or courts of the country of refuge shall be satisfied that the requisition is reasonable and that it is made in good faith.

Formal extradition treaties are of recent origin. As late as 1870 Great Britain had entered into treaties of this sort with France and the United States only. In that year a general extradition act passed by Parliament authorizing the British government to enter into extradition agreements provided expressly:

1. That a fugitive criminal shall not be surrendered for a political offence, or if he prove that his surrender has in fact been required with a view of trying him for a political offence.
2. Provision must be made that a surrendered criminal shall not be tried for any but the extradition crime.
3. Criminals accused or convicted of offences in England shall not be surrendered in extradition until they are discharged.
4. There must be an interval of 15 days between the committal to prison and the surrender.

The following statement is that of the *Britannica:*

"When the Act applies, a fugitive criminal of a foreign state is liable to surrender. A requisition for that purpose must be addressed to a secretary of state by some person recognized as a diplomatic representative of the foreign state. The secretary of state, unless he thinks the offence is one of a political character, may inform a police magistrate of the requisition, and require him to issue his warrant for the apprehension of the criminal. The police magistrate, when the criminal is brought before him, shall receive any evidence tending to show that the offence is political, or is not an extradition crime. If the evidence is such as would justify a committal for trial in England, or would prove that the prisoner has been convicted, the magistrate commits him to prison, and after fifteen days' interval, or if a *habeas corpus* is issued after the decision of the court, the secretary of state may by his warrant deliver him over to the representatives of the foreign country. If the prisoner

is not removed within two months he must be discharged."

The following is a list of extradition crimes, to be construed according to the law existing in England:

Murder and attempt and conspiring to murder; manslaughter; counterfeiting or altering money, and uttering; forgery, counterfeiting, and altering what is forged, etc.; embezzlement and larceny; obtaining money and goods by false pretenses; bankruptcy crime; fraud by bailee, banker, agent, etc.; rape; abduction; child-stealing; burglary and house-breaking; arson; robbery with violence; threats by letter or otherwise, with intent to extort; piracy by law of nations; sinking or destroying a vessel at sea, or attempting or conspiring to do so; assaults on board ship on the high seas, with intent to destroy life or to do grievous bodily harm; revolt or conspiracy to revolt by two or more persons on board a ship on the high seas against the authority of the master. The Extradition Act of 1873 adds the following:—Kidnapping and false imprisonment; perjury and subornation of perjury; and indictable offences, not previously named.

Jay's treaty of 1794 provided for extradition with Great Britain for a term of twelve years. After a lapse an extradition treaty agreement was entered into in 1842. In the same year an extradition treaty was negotiated with France.

The United States now has extradition treaties with about thirty nations. The list of extradition crimes, practically that of the United Kingdom, is: Arson; assassination; assault with intent to commit murder; burglary; circulation or fabrication of counterfeit moneys; counterfeiting public bonds, stamps, marks of state and administrative authority, etc.; embezzlement of the public money; embezzlement by public officers; embezzlement by persons hired or salaried; utterances of forged paper; forgery; infanticide; kidnaping; larceny of cattle or other goods and chattels of the value of twenty-five dollars (found only in the treaty with Mexico); mutiny; murder; mutilation; parricide; piracy; poisoning; rape; and robbery.

Eye, the organ of vision. In its simplest and essential form an eye is the end of a nerve sensitive to light. In many lower forms of animals it is merely a sensitive spot from which nerves run to the nervous center. Many insects have what is known as a compound eye. The bundle of optic nerves, on reaching the surface, spreads out like a treetop, each fiber terminating in a simple eye or facet. The eye of the ant is composed of about fifty of these fiber ends. There are 4,000 in the eye of the house fly. The prominent, handsome eye of the dragon fly or devil's darning-needle is made up of 20,000 facets. The structure of the human eye may be compared to a two-lens microscope. At the front, there is a body shaped like a watch glass, called the cornea, and a double-convex body, called the crystalline lens. These two are transparent and form an image. The wall of the rear or retina is composed of the fibers of the optic nerve. The image formed by the lenses falls on the retina. The impression is conveyed to the brain. The eyeball is merely a chamber designed to hold the lenses at the necessary distance from the retina. The various muscles and liquids, the iris, the eyelid, the eyelash, and eyebrow are mere accessories that adjust and protect the essential parts. The retina of the white man's eye is scarlet or vermilion; that of the Nubian negro is of a chocolate brown. It is said that man sees more accurately than other animals.

In most of the higher animals, including nearly all the vertebrates, the eye is developed as a very special sense-organ, of great structural complexity and functional delicacy. But from the point of view of comparative anatomy an eye is any part of an animal body which responds more readily than other parts to the special stimulus of light, or whose activity is specially excited by the impact of light-rays. In some members of the mollusk family, however, like the cuttlefishes, the eyes are highly specialized as organs of vision, like those of vertebrate animals, though constructed on a different plan. Vertebrates usually possess only one pair of eyes, these being placed in special formations of the skull, called the sockets or orbits of the eyes. There is usually a lachrymal apparatus, which secretes tears to moisten the eye, and also certain glands which lubricate the eye by secreting a greasy substance for that purpose. The front of the eye has usually a special mucous membrane, called the conjunctiva.

The eyeball in man and higher vertebrates consists mostly of a tough opaque membrane, called the sclerotic, behind the cornea, which is a hard transparent structure. The eye is freely movable and rolled about in its socket by means of two sets of muscles, including four straight and two oblique muscles, which are inserted into the sclerotic near the cornea, above, below and on either side. Thus the eye can move in every direction.

Besides the optic nerve, or special nerve of sight, the eye is supplied with other motor, sensory and sympathetic nerves, and has its appropriate blood-vessels. In man, both eyes look directly forward, their axes being parallel, though the sockets in which they are contained are directed a little outward, or away from each other. The optic nerve pierces the eyeball behind, a little on the inner side, that is, toward the nose.

The adaptation of the eye to distinct vision at every distance beyond that of a few inches is due to a process called *accommodation*. This process usually takes about one-third of a second, so that the focal distance may be changed about three times in a second; that is, accommodation of the vision from a near to a distant object, or vice versa. In myopia, or shortsightedness, and hypermetropia, or longsightedness, however, this power of adaptation of the eye is greatly limited. These defects of vision are corrected by the use of lenses, in spectacles or eyeglasses, concave lenses being used for shortsightedness and convex lenses for farsightedness. These correct the focus of the rays of light so that they throw the images of external objects at the proper angle upon the retina.

Injuries to the eyes constitute a large proportion of the accidents that occur in industrial employments, and all persons engaged in labor that subjects their eyes to possible injury are strongly urged by the National Safety Council to protect themselves by the use of glasses, or suitable masks.

Ezekiel, one of the four great prophets to whom is attributed one of the larger books of the Old Testament. He lived near the river Chebar in Babylonia, began his work at the age of thirty and continued it for twenty-two years. The time of his death is not known. The visions and utterances contained in *Ezekiel* are attributed in the book itself to the prophet Ezekiel. The prophecies are in chronological order, except those dealing with foreign nations. The authenticity of the book of *Ezekiel* has been but little questioned and it is looked upon by Biblical scholars as canonical.

Ezra, Book of, one of the books of the Old Testament, in which is related the story of the priest, Ezra, a descendant of Phineas, the son of Aaron. His father was Seraiah. Ezra was a man of large vision and well versed in the law of Moses. He was an exile in Persia, and while there he gained favor with the reigning monarch, Artaxerxes Longimanus, so much so that he received a commission to lead the second expedition of Jews back to their own land. This undertaking occurred in about the year 458 B. C. Later Ezra is at Jerusalem, where he is fulfilling his priestly functions under Nehemiah. The time and place of his death is uncertain. The period of history covered in the book of Ezra is about 80 years. viz., from the reign of Cyrus, 536 B. C., to that of Artaxerxes Longimanus, 456 B. C.; the reigns included are those of Cyrus, Cambyses, Smerdis, Darius Hystaspis, Xerxes, and part of that of Artaxerxes. The book is considered a part of the Scripture canon by both Jews and Christians.

F

Faber, Johann (1817-1896), a noted manufacturer. He was born in Stein, six miles from Nuremberg. Faber is noted as the founder of the manufacture of lead-pencils on a large scale. In earlier days, lead-pencils were made by hand in a small way. Faber built up a large factory at Stein and practically monopolized the lead-pencil business in Europe. His methods are not known generally, as visitors were not admitted. As the business enlarged, offices were opened in the large cities. A branch factory established near Paris employed over 1,000 operatives. Eberhard Faber, a younger member of the family, established first, a selling office in New York City, and later, a factory in the vicinity.

Fabian Society, an organization of socialists. There is an English organization, having headquarters in London, and an American organization. The English society maintains branches in the large industrial cities, and publishes "Fabian Tracts" from time to time. Pamphlets, known as "Fabian Tracts," are issued in advocacy of public ownership of land and of manufacturing plants. The American society publishes the *American Fabian,* a paper of like purpose.

Fabius, fā′be-ŭs, a noted Roman commander, called also Maximus the Great and Cunctator the Delayer. As a Roman schoolboy he is said to have been nicknamed "Warts" from a wart on his upper lip. He died 203 B. C. Fabius held military command on several critical occasions. He was five times consul, twice censor, and once dictator. His chief service was rendered in opposing the advance of Hannibal after the battle of Thrasymenus. Not feeling strong enough to meet the Carthaginian in open battle, he hovered about, striking at every exposed point, wearying and delaying the troops of Hannibal until they were worn out with marching and countermarching. In this way the season passed. Hannibal lost a golden opportunity of marching on Rome. During the campaigns of 1776-7, when the British overran New Jersey, Washington adopted the Fabian policy of harassing and delaying the enemy, making now and then a sudden attack, as in the case of the battle of Trenton. He is called sometimes the American Fabius. See HANNIBAL.

Fable. See AESOP; LOCKMAN; LA FONTAINE; ANDERSEN.

Fable for Critics. See LOWELL.

Fabric, a cloth formed from fibrous material. The word fabric is from a Latin word meaning workshop. A structure of any kind may be called properly a fabric. Distinctively, cloth is a textile fabric, but the unmodified word fabric is in common use to designate cloth of any variety. The principal materials of which fabrics are made are cotton, flax, hemp, wool, mohair, and silk. Fabrics may be produced by weaving, knitting, crocheting, felting, netting, braiding, and by tapestry work.

1. Woven fabrics are produced in a loom by two sets of interlacing threads, running respectively lengthwise and crosswise.
2. Knitted and crocheted fabrics are formed by loops of a single thread, each loop being drawn through the preceding loop, or each series of loops through the preceding series.
3. Felted fabrics are produced by the permanent matting of animal fibers.
4. Netting is closely akin to weaving, but the threads are knotted to form meshes instead of being interlaced.
5. In braiding, the threads are interlaced, but only one set of threads is used. These run in a serpentine or zigzag fashion from side to side.
6. Tapestry is a fabric in which one set of threads is used as a foundation, and short threads are interlaced by hand in such a fashion as to entirely encase the foundation threads.

By far the greater number of fabrics in common use are woven. Many varieties are regarded as standard; others are classed as novelties, appearing only during short periods. Old fabrics are frequently revived under new names. The most important varieties of weaving are plain weave, twill, satin weave, pile weave, Jacquard or figured weaving, corded, and ribbed weaving. Standard fabrics produced by plain weaving are taffeta silk, flannel, calico, bunting, and canvas. In these the weave is plainly visible. Broadcloth and outing cloth are varieties of plain weave in which the weave is concealed by the nap. Twill weaving is seen in serge, cashmere, the right side of canton flannel, surah silk, and many other fabrics. Satin weave, which is a special adaptation of the principle involved in twill weaving, is the peculiar characteristic of satin and of damask. Jacquard or figured weave is seen in figured damask, in brocades, and in all loom-figured fabrics on which the design is large or spreading. Bedford cord and corduroy are examples of corded fabrics; grosgrain silk and rep, of ribbed fabrics. To pile-woven textiles belong such common fabrics as velvet, plush, corduroy, and astrakhan cloth.

Factory System, a name applied to modern methods of manufacturing. The essence of the system is the bringing together of wage-earners to labor under supervision. A building or group of buildings used to shelter raw materials, machinery, wage-earners, and products is known as a factory. The wage-earners—men, women, or children—are called operatives or hands. Factories of a certain sort existed among the ancients. In Greece, Rome, and the older civilizations of Egypt, Assyria, India, and China, slaves worked under taskmasters, but these were not modern factories. The guild system of the medieval ages was based on workshops in which the master and a limited number of journeymen and apprentices worked together. The guild system was followed by the domestic system. The features of this system may be understood from an often quoted passage from James' *History of the Worsted Manufacture:*

> The work was entirely domestic, and its different branches widely scattered over the country. First, the manufacturer had to travel on horseback to purchase his raw material among the farmers, or at the great fairs held in those old towns that had formerly been the exclusive markets, or, as they were called, "staples" of wool. The wool, safely received, was handed over to the sorters, who rigorously applied their gage of required length of staple and mercilessly chopped off by shears or hatchet what did not reach the standard as wool fit for the clothing trade. The long wool thus passed into the hands of the combers, and, having been brought back by them into the combed state, was again carefully packed and strapped on the back of the sturdy horse, to be taken into the country to be spun. . . . Here, in each village, he had his agents, who received the wool, distributed it among the peasantry, and received it back as yarn. The machine employed was still the old one-thread wheel, and in summer weather on many a village green might be seen the housewives plying their busy trade, and furnishing to the poet the vision of contentment spinning at the cottage-door. Returning in safety with his yarn, the manufacturer had now to seek out his weavers, who ultimately delivered to him his camblets or russels, or serges, or tammies, or calimancoes (such were the leading names of the fibers) ready for sale to the merchant or delivery to the dyer.

The domestic system is followed yet in the weaving villages of Scotland. Materials are weighed out to the weavers, who operate looms in their own cottages. The system holds on in the silk district of Lyons, France. It is more or less prevalent in Russia. The small village landholders of Switzerland eke out a winter income by taking home woodcarving, the making of parts of a watch, etc. Handmade lace is made customarily in the homes of Ireland, Germany, and Switzerland. In general it may be said that handmade goods are produced largely by domestic manufacture. The factory system has been built up under the influence of machinery. Capital is required to install machinery, and capital is required to provide shelter for machinery. Machinery and buildings mean a factory.

The first modern factory is said to have been a silk factory. It was built in Derbyshire, England, in 1719. The invention of labor-saving machinery enabled factories to produce at a reduced cost. Handmade goods were driven out of the market by less expensive machine-made goods. The earlier

factory buildings were rude affairs, and the machinery was of a crude type; but one labor-saving device followed another. By the time the year 1800 had arrived we may say the factory system was intrenched. Factories became profitable.

Marked social changes ensued. As large factories arose work in the cottages fell off. With the growth of factories and the assemblage of operatives large cities grew up and villages disappeared from the map. A vast population left the quiet, economy, and good air of cottage homes for vile, expensive city tenements. Vice and drunkenness, which assume the most repulsive forms in crowded cities, gathered their victims into slums. The invention of machinery, requiring only attention such as the knotting of a broken thread rather than muscular strength, led to the employment of women because women could be hired cheaper than men. A child can tie a thread as deftly as a woman and can be hired to do it for less money; so children were employed. Adults were forced to go idle or work for children's wages. Home life was broken up. Home became a place for sleep and hurried meals.

The change from handmade to machine-made wares, from domestic manufactures to the factory system, from conditions of rural comfort to city life, is known in history as the industrial revolution. It is difficult to realize the wretchedness that existed during the latter part of the eighteenth and early part of the nineteenth century. There were no unions to defend the rights of labor. Thoughtless, not to say inhuman, employers were free to employ for the lowest wage they could induce anybody to work for. They were free to keep their machinery going for as many hours as they saw fit. The manager of an enterprise requiring the ownership of many horses was obliged to feed, shelter, and rest his animals or his profits vanished in dead horses; but the factory owner was troubled by no such prospect. He paid his wages, and, if the operative did not return, the manager employed another. Orphans and pauper children were shipped from the rural parishes, where it cost something to feed and educate them, to the factory towns where they could join the vast army of enslaved children. Not many years were required to demonstrate that an unregulated factory system tended to the production of stunted children, crass ignorance, not to say imbecility, and to moral degeneracy.

The British public became alarmed. Sir Robert Peel, himself a wealthy manufacturer, familiar with the evils of the factory system, introduced a bill in the British Parliament as early as 1802, the title of which was "An Act for the preservation of the health and morals of apprentices and others employed in the cotton and other mills and in cotton and other factories." The bill as passed was shorn of its most useful features, but Peel came at Parliament again and again. Measures for the inspection and regulation of factories are not the least of the services rendered the world by this illustrious statesman. Parliamentary commissions appointed to investigate reported conditions that were a disgrace to Christendom. Charles Dickens wrote tales of the shop and factory that brought indignant tears to the eye. Thomas Carlyle fumed and denounced capital for buying human life for a crust of bread. Wilberforce pleaded with Parliament to shorten hours of labor and exclude children from the workshop. *The Cry of the Children* by Elizabeth Barrett Browning stung the public conscience into legislative activity.

Owing to more primitive conditions,—the absorption of the American people in roadmaking and in homemaking and in transportation,—and owing to the repressive measures of Parliament,—for Great Britain made it a penal offense to ship textile machinery out of the country,—the rise of the factory system was delayed a full century in the United States. The first successful American textile factory was erected at Beverly, Massachusetts, in 1787. Samuel Slater, "the father of American manufactures," erected a well equipped cotton mill at Pawtucket in 1790. Lowell and other New England towns became factory centers. The earlier factory operatives were noted for intelligence and character. Lucy Larcom, as well as many

a girl of the best New England families, was one of them; but the evils that arose in England soon made their appearance here. Factories grew larger, and towns grew. Typical factory conditions led to official investigation and remedial legislation.

The field of factory inspection and regulation is an extensive one. Under the threefold stimulus of labor unions, considerations of national prosperity, and sentiments of common humanity, modern legislators have been active. Salutary and far-reaching factory laws have been enacted, not only by all English-speaking states, but by the countries of Continental Europe, and by India and Japan as well. England has the honor of having led the way in 1802; Germany stepped off in 1839; France followed in 1841. An International Congress in relation to labor legislation was held in Berlin in 1890, with excellent results. The factory laws of a nation may now be regarded as an index of its degree of enlightenment. The world has copied the factory legislation of the United Kingdom to a large extent.

An outline of the factory laws now in force would occupy several pages. Sanitary conditions are insisted upon; ventilation, heating, and lighting have been reduced to rules; overcrowding is forbidden; dust, vapors, and gases must be removed by exhaust fans or otherwise; walls must be purified with limewater or paint; and proper toilet facilities must be provided. Strict regulations have been adopted to prevent accidents; children are not permitted to clean machinery while in motion; inspectors are authorized to require the installation of guards for vats, pans, saws, planes, cogs, gearing, belting, and shafting; elevators and hoistways are safeguarded; danger in the manufacture of explosives is reduced; doors must be unlocked during working hours and must swing outward; stairways must be ample and not too steep; fire escapes are required; and the operation of particularly dangerous machinery is reserved for experts. In no other respect have factory laws made greater advancement than in shortening and restricting the hours of labor. Laws very generally forbid the employment of females underground, bar them from certain unsuitable occupations, forbid night work, and limit the number of hours women may be permitted to work.

In the United States, legislation affecting labor, except that of Federal employees, is a matter of state concern, and in recent years there has been a bewildering mass of statutes enacted in the various states affecting the conditions of labor under the factory system. In 1922 the Supreme Court declared unconstitutional a national child labor law, and a similar measure aimed to prevent the employment of young children in industry failed of passage in the final session of the 67th Congress, which expired March 4, 1923. Most of the states, however, prohibit the labor of children under 14 years of age in factories, workshops and mines. In some cases, the hours of labor are limited for minors who have not reached the age of 18 years, or sometimes 21 years; but children of tender age are still largely employed in the cotton industry of the South.

Laws for the compensation of workmen for injuries received in the course of employment and providing for compensation to their families in case of death or permanent disability have also been enacted recently in many states, to replace the former statutes called employers' liability acts; and these are generally more favorable to labor. The general effect of such legislation has been to place upon the employer the burden of proof that the injured workman was negligent.

One important development of the factory system has been the great and growing influence of labor unions, and a consequent movement in various industries and localities to establish the principle of the "open shop," or the employment of unorganized workmen on an equal basis with those who are organized in unions. Some of the basic industries of the country are largely dominated by organized labor, while a few great concerns, like the United States Steel Corporation, have succeeded in maintaining the "open shop."

Under the factory system, strikes and

lockouts have been frequent and expensive to industry, and the great problem of the relations of capital and labor is one that presses for solution. The United States Department of Labor in 1921 was largely engaged in solving the problem of unemployment, which also seriously affected Great Britain and other European countries. At the beginning of this period it was estimated that between five and six million workers were without employment in the United States, and immigration was restricted by Federal statute. A revival of industry in 1922 assisted in removing this condition, but the year was marked by two of the greatest strikes the country had seen ,those of the coal miners and the railway shop crafts. The period of industrial readjustment through which the country was passing after the war made the settlement of industrial disputes more difficult. From March 4, 1921, to June 30, 1922, more than 500 cases of strikes and lockouts were acted upon by the Department of Labor.

Most authorities admit the great industrial advantage of the factory system, and under this system it is true that the conditions of labor are much more easily regulated by law than in the small workshops of the preceding system of industry. But many sociologists contend that its effects upon the factory employee are unfortunate, and that it tends to the exploitation of labor in the mass, leading to physical, mental and moral degeneracy of the working population. It is also contended that the factory system, by keeping each individual worker engaged in the repetition of a single task, requires and creates a lower grade of intelligence among workmen than the former system, under which the worker learned and knew the whole of his trade. But under the system as applied in America the lower grades of workmen may by individual efficiency and character rise to positions of supervision and enjoy a lot far superior to that of the all-around workman of the earlier system; and the standards of living of the American workman at any rate have been considerably improved in recent years. The specialization of certain industries in given communities under the factory system has also given a great impetus to commerce, and by bringing about the organization of labor in collective resistance to unfavorable conditions of employment, it has given the laborer a political power and importance which he did not possess under any previous system of industrial economy.

Faerie Queene, The. See SPENSER.

Fagging, a peculiar system of service in vogue in English public schools, as at Eton, Harrow, Rugby, and Winchester. On entering school each boy is assigned as a fag or servant to an upper class man. He is required to black shoes, toast bread, brush clothing, run errands, chase balls, carry books; in short, to perform all sorts of menial services for his superior, under whom he is a sort of body servant. Under ideal conditions a little fellow is supposed to be very proud of the tall, distinguished student for whom he fags and from whom he receives protection in the rough and tumble of school life. Friendships formed in this way have continued through life. Dicky Steele, the author of *The Tale of a Tub* and promoter of *The Spectator,* was Joe Addison's fag at the Charterhouse School at London. If the truth were known, many an appointment to public position has been made by reason of an attachment formed when the candidate was a fag in a public school. On the other hand, the large students sometimes proved harsh and even brutal in their treatment of the little chaps entrusted to their care. The custom is less prevalent than it once was. An account of fagging may be found in *Tom Brown's School Days at Rugby.*

Fagin, fā′gin, in Charles Dickens' *Oliver Twist,* a Jew who trains children in crime, appropriating to himself what they procure by thieving and picking pockets. Oliver is first introduced to Fagin by the Artful Dodger. Latter, when he has been befriended by Mr. Brownlow, he is abducted by Fagin's agents and an effort is made to lead him into a life of crime. Fagin is, in the end, condemned to death for complicity in a murder.

Fahrenheit, fä′ren-hīt, **Gabriel** (1686-1736), a German scientist. He was born at Dantzic and died at Amsterdam.

He was a tradesman, but gave over business for the pleasures of science. He originated the idea of using mercury in thermometers. The point of greatest cold observed at Dantzic he called zero. He divided the space between this zero and the height to which his column of quicksilver rose in boiling water into 212 parts. Discovering later that he could obtain a still greater degree of cold by artificial means, he adopted the temperature of a mixture of ice and salt as a more scientific zero. Prior to Fahrenheit, spirits of wine—alcohol—was used to mark changes in temperature. See THERMOMETER; CELSIUS.

Faience, or **Fayence,** soft-bodied, glazed pottery. The name is derived from Faenza, Italy, where the art of glazing soft ware was understood as early as 1299. Faience differs from porcelain chiefly in having a soft body and a thin glaze. Two firings are needed. The art was carried to France about 1578. Joseph Wedgewood of England set up a faience factory in 1763. Wedgewood wares are famous. The Rookwood wares are faience. The term may be applied to faience wares of all descriptions; but it is used more frequently to denote vases, cups, pitchers, and other receptacles. Faience implies decoration of a high order. Faience art has engaged the attention of noted artists.

Fainting, falling into a swoon, with loss of consciousness. Fainting may result from extreme hunger, fatigue, excessive excitement, fear, excessive pain, a shocking sight, or even from an offensive odor. In any case, the immediate cause is a stoppage of the flow of blood to the brain. While not necessarily dangerous, a fainting fit should be relieved immediately by loosening the clothing about the throat and having the patient lie at rest with the head somewhat lower than the rest of the body, to facilitate the flow of blood in that direction. Physicians maintain that dashing water into the face and the application of smelling salts have no bearing on the case, as the patient cannot recover until the brain has received a supply of blood. See BLOOD.

Fair, in commercial history, a market held on a stated day in a particular town or city. The word means a holiday. The fairs of Europe seem to have originated in the offering of wares on the occasion of church festivals. In fact, the Germans call a fair a *messe,* the exact equivalent of our word *mass.* Fairs attained importance during the Middle Ages. A great fair sprang up at Mecca and is still held during the annual pilgrimage. Hindu fairs were held on similar occasions. Nijni-Novgorod is famous for fairs. Donnybrook Fair was held near Dublin. Glasgow Fair was noted. Greenwich and Bartholomew fairs grew up at London. Frankfort-on-the-Main and Lyons, France, were noted for fairs. An account of the Leipsic Fair may be read under that title. See BARTHOLOMEW; NIJNI-NOVGOROD; GILD.

Much of the buying and selling of the country was done not in the towns but at the fairs. The fairs were gatherings held at various places yearly or oftener. The right to hold a fair was dependent on a charter which had been granted by the king to an abbey, bishop, baron, or even a town government. The bishop of Winchester, for instance, had a charter granted to him by William II, allowing him to hold a fair every year, lasting two weeks. It was held on a hill not far from the town of Winchester. Booths or wooden shops were put up and rented to merchants, who came from different parts of England and from other countries to buy and sell. Tolls were charged by the bishop on everything that changed hands. While it was being held, nothing except food could be bought or sold in the city of Winchester itself or for several miles around.

The bishop's officers held a court at the fair for the immediate settlement of disputes that broke out among the merchants, and for the punishment of offenses committed there. This was called a court of "pie-powder," which was an English mispronunciation of the French words *pied poudré,* "dusty foot." The court was so called because of the promptitude of its action. Men might come to it just as they were, without even stopping to brush the dust from their shoes. There were six or eight fairs in England as famous as that of Winchester, and several hundred of lesser importance, many of them being held in mere villages and only for the sale of live stock or of some special article. More than a hundred charters for fairs were granted in King John's time, and more than two hundred in the time of Henry III.—Cheyney's *England.*

Fair, an exhibit of wares and productions. The original fair was a market, a concourse of buyers and sellers who met in the shelter of temporary booths or in the open to sell and buy cloth, china, timber,

grain, cattle, oil, or any of the great staples. The name has been taken over by the agricultural societies of English-speaking countries and applied to exhibits, particularly of live stock, produce, and machinery.

The typical agricultural fair of the United States and Canada is conducted within inclosed "fair grounds," to which an admission fee of twenty-five or fifty cents is charged. The grounds include usually a race track, a "grand stand," or amphitheater of raised seats for viewing the races, stalls or buildings for the reception of live stock, and buildings for the exhibition of machinery, merchandise, fruits, vegetables, flowers, dairy products, needlework, school work, etc. The buildings of local fair grounds may consist of a few stalls for stock, and single buildings for exhibits that require shelter; or, if for a state fair, they may cost a million.

The fair grounds at Hamline, Minnesota, one of the prosperous state fairs in the Middle West, may be taken as a type. The grounds embrace 322 acres. What with barns, a poultry building, a dairy building, an amphitheater for showing and judging live stock, a main exposition building, an agricultural and horticultural hall, halls for the display of machinery, and a grand stand, the property represents a value of over $1,000,000, about half of which has been acquired by legislative appropriations.

The management is entrusted to a board whose responsible officials reside on the grounds and give their undivided attention to the interests of the fair. The attendance at this particular fair in 1908 was 326,743; and of this number a full half paid a second admission fee to the grand stand. This fair is twenty years old and has paid out $800,000 in premiums and purses.

Most states and provinces grant aid to a central state or provincial fair, and to local fairs. The management is entrusted usually to state and county agricultural societies. County and local fairs are doing much to create wholesome emulation among the farmers. Of late, school exhibits have become a promising feature. Exhibits from rural school gardens and corn-growing contests are made a feature in an increasing number of county fairs.

Exhibits of a single product are called shows, as live stock shows, corn shows, fruit shows, apple shows, etc.

County and local fairs might well be part of a thoroughly organized state system, and be taken out of the influence of showmen and race-track gamblers. The fair should be a kind of school, and its work and influence should exist continuously throughout the year. The fair-ground itself should not be idle fifty-one weeks in the year. Its facilities could be used for many exhibits and schools at other times; and a good part of the grounds could be utilized by school children or others to grow plants that should stand in exhibition and teach a lesson when the fair comes round. It is not too much to hope that fair grounds may some day contain school gardens. Such an associative organization should go with a fair as will keep intending participants—I do not like the word exhibitors—in a state of preparation and attention for the whole year. The fair should reach all farm children, and the significance of everything shown at a fair should be explained by a good teacher standing on the spot.—L. H. Bailey.

Fairbanks, Alaska, the city and capital of the fourth judicial district, is on the Tanana River near the head of navigation, 160 miles west of Dawson and 45 miles from Chena by the Tanana Railroad. The United States government has completed, at a cost of over $52,000,000, the construction of a railroad in Alaska, one branch of which connects Fairbanks with the Matanuska coal fields.

Fairbanks has a short summer, during which vegetables and flowers flourish. Gold mining has always been one of the chief industries. In summer there is steamboat connection with Dawson to the east and Saint Michael to the west. The town has modern facilities, such as a central steamheating plant for stores and residences, telegraph connection and electric lighting. Population, 1,155.

Fairbanks, Charles Warren (1852-1918), an American lawyer and legislator, twenty-sixth Vice-President of the United States. He was born in Union County, Ohio, and was graduated from Ohio Wesleyan University in 1872. In 1874 Mr. Fairbanks was admitted to the Ohio bar and in the same year removed to Indianapolis, where he established practice. He was delegate-at-large to the Republican national convention in 1896, and

in 1898 was appointed a member of the American and British Joint High Commission that met in Quebec to adjust the Canadian questions relating to the Alaskan sealing grounds. Mr. Fairbanks was elected to the Senate in 1897 and re-elected in 1903. In 1904 he was elected Vice-President of the United States. He toured the world after the expiration of his term. In 1916 he was nominated for the vice-presidency on the ticket with Charles Evans Hughes.

Fairchild, Lucius (1831-96), an American military officer, was born in Kent, Ohio, removing to Madison, Wisconsin, in 1846. He studied law there and was admitted to the bar in 1860. At the beginning of the Civil War he enlisted as a private, and in 1861 was appointed a captain in the regular army, and major in the volunteer army. He commanded the famous Iron Brigade at Bull Run, and led the charge up Seminary Hill at Gettysburg, where he lost his left arm. In 1863 he was made a Brigadier-General, but resigned in the same year to become secretary of state of Wisconsin. He was afterwards elected governor, and served for three terms, consecutively. In 1872 he was appointed consul at Liverpool, consul general at Paris in 1878, and minister to Spain from 1880 to 1882. In 1886 he was elected commander in chief of the Grand Army of the Republic. He died in Madison, Wisconsin, May 23, 1896.

Fairfax, an English-American family of good repute. The Fairfaxes were barons in the county of York. The second Baron Fairfax (1584-1648) was a member of the Long Parliament and commanded the forces of his county at the battle of Marston Moor. A son, the third Baron Fairfax, led a squadron of horsemen in the same battle. In 1645 he was made commander-in-chief of the parliamentary forces. He defeated Charles I at Naseby and was one of the commissioners to invite Charles II to return to England. He left autobiographical works covering the years of his public activity. The sixth of his name is known in American history as Lord Fairfax. The paternal estate in Yorkshire having been sold to pay his father's creditors, this Thomas Fairfax emigrated to Virginia, where he inherited a large tract of land from his mother, a daughter of Lord Culpepper. He settled eventually near Winchester. He employed George Washington to survey his lands in the Shenandoah Valley. He was an admirer of young Washington, but remained an ardent loyalist. This American Lord Fairfax was a man of education and fine feeling. He was educated at Oxford and contributed papers to Addison's *Spectator*. Successive heirs to the family title have lived in Virginia. The eleventh "Lord Fairfax," if he had cared to return to England and claim an empty title, died in Northampton, Maryland, in 1900. See WASHINGTON, GEORGE.

Fair Maid of Norway (1283-1290), the name by which Margaret, the little daughter of Eric II of Norway, is known in Scottish history. Margaret's mother was the daughter of Alexander III of Scotland. Alexander III died in 1285. Immediately a betrothal was arranged by Edward I of England between Margaret and his son. When the little girl was seven years old, she started for Scotland, but died on the journey. The circumstances of her death were never known clearly, and suspicion of foul play was entertained. Some thought she had been made way with at sea, others that she had been taken away and kept in concealment. About ten years afterward a woman appeared in Leipsic who claimed that she was the lost Margaret. She was proved to be an imposter.

Fairmont, West Virginia, a city and the county seat of Marion County, is 77 miles southwest of Wheeling, situated on both sides of the Monongahela River, and on the New York Central, the Monongahela Valley and the Baltimore & Ohio Railroads.

Among the city's buildings are a state normal school, a hospital and training school for nurses, a court house, good public schools, and a state hospital for miners.

Coal mining is an important industry, and there is a large trade in glass products. Other industries include flour mills, planing mills, foundries and machine shops, cigar factories, etc.

Fairmont adopted the commission form of government in 1914. Some of the public utilities are owned by the city. Population, 17,851.

Fair Oaks, Battle of, also known as the Battle of Seven Pines, was fought about 7 miles east of Richmond, Virginia, May 31 and June 1, 1862, by a force of about 42,000 Federals under command of General McClellan, and an equal force of Confederates under Generals Joseph E. Johnston and G. W. Smith. The names of the battle come from the Fair Oaks station, on the Richmond and York River Railroad, and from a tavern called the Seven Pines, on the battlefield. The fighting was fierce and stubborn on both sides. During the course of the battle General Johnston was severely wounded. On the night of the 2d the Confederates were withdrawn to the neighborhood of Richmond. The Federal loss was about 5,000 in killed, wounded and missing, and that of the Confederates over 6,000.

Fairy, fâr'y, a general name for an imaginary wee being in human form. As gods and goddesses, nymphs and fauns appear in ancient mythologies, so among the medieval peoples fairies are the beings who preside at birth and control the destiny of man. The word is from the Latin, and is akin to fate. The English word fairy meant originally, "enchanted," while the elf or spirit was designated by "fay." At an early date, however, the mistake was made of calling a fay a fairy, and the word fairy has been long in usage in this sense. In many of the older tales of fairies there seems nothing in form, size, or appearance to distinguish them from human beings, but they possess supernatural knowledge and powers. In later stories, fairies are usually diminutive. A writer on the traditions of Ireland says that the fairies are only a few inches high; that they are "light and airy in form, so that one may dance on a dewdrop, which trembles, indeed, but never breaks."

Specific terms for various types of fairies are in use. Thus the elf is usually mischievous; the sylph is a graceful, floating creature living in the air; the gnome is grotesque and homely, living underground. The German cobald lives in mines. The Arabian genie is a worker of the miraculous,—as the genie of Aladdin's lamp and the genie whom the fishermen let out of the bottle. The Irish banshee, a little wrinkled, aristocratic old lady, appeared under the windows of great houses and sang in mournful accents, warning the family of impending death. The Scottish brownies lurked about farm houses. If made welcome, and not begrudged bite and sup, they did many a piece of drudgery while master and servant slept. Puck, otherwise known as Robin Goodfellow and as Friar Rush, was their chief. He is described by Shakespeare in *Midsummer Night's Dream.* The erlking of the Germans and Scandinavians worked mischief to children or lured them away by night.

To fairies, good and evil, the peasantry of western Europe were wont to ascribe whatever was out of the ordinary or not readily understood. If money was found the fairies had dropped it with benevolent intent. If milk turned sour it was the work of fairies. The delicate gossamer webs seen of a dewy morn were the fairies' washing spread out to dry. As is well known, many kinds of mushrooms grow in circles, more and more remote from the center where the growth began. A circle of these umbrella-like toadstools springs up oftentimes over night. They were called fairy rings, within which the fairies were held to dance. Stone arrowheads were the weapons of the elves.

Fairies were supposed to inhabit a distinct realm, called Fairyland. Oberon was the king. His name appears first in an old French tale. Mab was the queen, her name coming from the Welsh. The name Titania for the fairy queen was first used by Shakespeare in *Midsummer Night's Dream.* Perriwinkle, Perriwiggin, and Tom Thumb are courtiers. Hop, Mop, Skip, Pink, Tib, Wim, and similar names designate the maids of honor. Morgana or Morgan le Fay is a prominent fairy in the Arthurian legends. Spenser's *Faerie Queene* and Shakespeare's plays are examples of the use of fairies in literature. Shakespeare's plays are full of fairy people.

See BROWNIE; CHANGELING.

Up the airy mountain,
  Down the rushy glen
We daren't go a-hunting,
  For fear of little men;
Wee folk, good folk,
  Trooping all together;
Green jacket, red cap,
  And white owl's feather.
—Allingham.

He put his acorn helmet on;
It was plumed of the silk of the thistle-down;
The corslet plate that guarded his breast
Was once the wild bee's golden vest;
His cloak, of a thousand mingled dyes,
Was formed of the wings of butterflies;
His shield was the shell of a lady-bug queen,
Studs of gold on a ground of green;
And the quivering lance which he brandished bright,
Was the sting of a wasp he had slain in fight.
Swift he bestrode his fire-fly steed;
He bared his blade of the bent grass blue;
He drove his spurs of the cockle-seed,
And away like a glance of thought he flew.
—Drake, *The Culprit Fay.*

Fairy Tales, as generally used, juvenile stories in which fairies of any sort play an important part. The fairy tales which are of greatest interest are the old stories which were handed down orally from one generation to another and which, since the invention of printing, have appeared in a variety of forms and in many collections. These may be called folk tales; while fairy stories written in more recent times are classed as individual or modern fairy tales. A few of the best known folk tales are: *Puss in Boots, Cinderella, Tom Thumb, Beauty and the Beast, Hop o' My Thumb, Jack, the Giant-Killer, The Sleeping Beauty, Little Red Riding Hood, Hansel and Gretel, Babes in the Wood.*

A collection of fairy tales was printed in Venice as early as 1550. Charles Perrault, a French writer, rewrote eighteen charming fairy tales, which he published in 1697. In the early part of the nineteenth century Jacob and William Grimm made the most complete collection of fairy tales ever published. Their work includes folk tales from nearly all nations.

Modern or individual fairy tales for the most part demand only passing interest. A few, however, deserve and have obtained a wider and more lasting popularity. Such are the tales of Hans Christian Andersen, —*The Ugly Duckling, The Tin Soldier,* and *The Fir Tree.* Mrs. Craik's *The Little Lame Prince,* George Macdonald's *At the Back of the North Wind,* Lewis Carroll's *Alice's Adventures in Wonderland,* and some of the tales in Mary Wilkins' *The Pot of Gold* deserve a place among the best fairy tales.

Faith Cure. See CHRISTIAN SCIENCE.

Falcon, faw'k'n, a large family of birds of prey, including the eagle and the hawk. The falcon of history—the bird chiefly employed in hawking or falconry—is the peregrine falcon, a bold, long-winged, swift game hawk, found on both continents. In America it is called usually the duck hawk. The male is about sixteen inches in length; the female, nineteen; upper parts dark bluish slate color; under parts cream-buff, barred and spotted with black except on the breast. The female falcon, as is true of the family in general, is larger than her mate. The falcon nests on rocky cliffs or in hollow limbs of tall trees. Before the day of gunpowder falcons were trained to take game.

Falconer, Sir Robert Alexander (1867-), a distinguished Canadian educator and author, elected president of Toronto University in 1907. He was born at Charlottetown, Prince Edward Island, and as a boy spent eight years in Trinidad, British West Indies. Sir Robert was educated in Trinidad, and at the universities of Edinburgh, Leipzig, Berlin and Morburg. From 1892 to 1895 he was lecturer on New Testament Exigesis at Pine Hill College, Halifax, N. S.; professor from 1895 to 1904; and principal from 1904 to 1907. In the latter year he became president of Toronto University. He is the author of *The Truth of the Apostolic Gospel, The German Tragedy and Its Meaning for Canada* and *Idealism in National Character.*

Falconio, Diomede, a cardinal of the Roman Catholic Church. He early entered the Franciscan order, came to the United States at the age of twenty, was ordained priest in 1866, and taught philosophy at St. Bonaventure's College, of which he afterwards became president. He held one church office after another until 1899, when Leo XIII appointed him Apostolic Del-

egate to Canada and three years later transferred him to a similar work in Washington. He was elevated to the cardinalate November 27.

Falkland, fawk'land, a group of islands in the southern Atlantic, 300 miles east of Magellan Straits. There are two large islands and about 100 small ones, having a total area of 6,500 square miles. The total population is about 2,000. The group belongs to Great Britain. Schools and a postal system are maintained. The chief industry is sheep farming, although horses, cattle, and swine are raised. The leading exports are wool, hides, sheep pelts, and tallow.

Fallieres, Clement Armand (1841-), a French statesman, eighth President of the French Republic. He was born at Mézin, department of Lot-et-Garonne, and educated in Paris. He became a lawyer, and in 1870-73 was mayor of Nérac. In 1876 M. Fallieres was elected Republican member of the Chamber of Deputies from the arrandissment of Nérac. He attracted attention as a speaker and debater on the Republican left and in 1877 was reelected. From 1880 to 1882 M. Fallieres was under-secretary in the Ministry of the Interior, and at the end of his term was prime minister for 22 days. He became successively Minister of Public Instruction, Minister of the Interior and Minister of Justice. Entering the Senate in 1890, M. Fallieres became president of that body in 1899, serving in that capacity for seven years. In 1906 he was elected to the Presidency.

Fall River, a city in Bristol County, Massachusetts, on Mount Hope Bay, an arm of Narragansett Bay. It is about forty miles south of Boston at the mouth of the Taunton River. Fine steamers of the Fall River Line ply between Boston and New York, forming the chief route of travel between those cities in the summer. The combined facilities of water power and water transportation are greater at Fall River than at any other city on the Atlantic coast. Cotton cloth is manufactured there in greater quantities than anywhere else in the United States. Other industries are the dyeing and finishing of textiles, granite quarrying, the manufacture of machinery, brewing, and carriage making. Many of the buildings are of granite, so that the well laid-out streets present a handsome appearance. Among the noteworthy institutions there are Notre Dame College, Mount Hope School, the Bradford Durfee Textile School, the Fall River Conservatory of Music, the Fall River Training School, three large hospitals, the post-office, the customs-house, the public library, and the state armory. In 1843 a great fire devastated the city, which was rebuilt under the name of Troy, though it afterward resumed its old name. In 1904-6 it was the scene of the most serious strike of textile workers in the history of that industry, and lost about 20,000 people. Its population in 1920 was 120,485.

Falling Bodies, bodies moving toward the center of the earth by reason of the attraction of gravitation. Theoretically bodies fall toward the center. As a matter of fact the more rapid rotation of the earth's surface gives a falling body an eastward motion. A monkey-wrench or other object dropped down the Red Jacket shaft of the Calumet and Hecla copper mine of Michigan lodges on the east side of the shaft half way down. Galileo worked out the laws of falling bodies by dropping large and small iron balls from the top of the Leaning Tower of Pisa. He found, for instance, that large and small balls reached the ground at the same moment. He found also that bodies fall 16 feet during the first second, 3 times 16 feet during the second second, 5 times 16 feet during the third second, and so on; the gain in distance being the same for each second. The distance through which a body falls in any given second may be found by multiplying 16 feet by one less than twice the number of the second. The total distance through which a body falls in any given number of seconds may be found by adding these values. The same result may be obtained if 16 feet be multiplied by the square of the number of seconds. In 2 seconds a body starting from rest will fall ($16 \times 2 \times 2$) or 64 feet; in $2\frac{1}{2}$ seconds, ($16 \times 2\frac{1}{2} \times 2\frac{1}{2}$) or 100 feet; in 5 seconds, ($16 \times 5 \times 5$) or 400

feet. The foregoing rules apply only to objects of sufficient weight to fall without sensible resistance from the atmosphere. A feather or piece of tissue paper encounters too much resistance from the air to illustrate the laws. If either were made into a pellet under great pressure it would drop like a grain of shot. If a stone be thrown upward it will occupy as much time in falling as it took in going up. The laws of falling bodies, therefore, apply to bodies thrown upward as well. If the length of time that a missile is in the air be divided by two we have the length of time required in falling, and can estimate the height to which it rose. The horizontal distance to which it is thrown has no influence on the time of rising and falling, and may be left out of account. See GRAVITY, SPECIFIC.

Fallow Deer, a small European deer, now kept in parks, and in private grounds. It is smaller than the red deer, standing about three feet high at the withers. It is yellow in color, spotted with white. The name is derived from the adjective fallow, meaning yellowish. See DEER.

Falstaff, Sir John, a good natured but rascally old knight in Shakespeare's *Henry IV,* and in *Merry Wives of Windsor.* He is the chief of Prince Hal's riotous companions. When the play was first presented the character was called Sir John Oldcastle, and the interest centered in this figure. Sir John Oldcastle, Lord Cobham, is a historical character. He was an English nobleman of the fourteenth century,—an author, a soldier, a Lollard leader. He was a personal friend and a companion of Henry IV, and suffered martyrdom as a heretic and traitor under Henry V. He was known as the "good Lord Cobham." Shakespeare's character, therefore, while extremely popular, was looked upon as a caricature, and certain descendants of the original Sir John Oldcastle raised objections. When the first part of the play of Henry IV was published, the knight received the name of Falstaff, and the epilogue stated that "Oldcastle died a martyr, and this is not the man." The name, and perhaps the character, now brought dimly to mind Sir John Fastolf, a warrior of the fifteenth century, and Shakespeare was criticised "for making overbold with a great warrior's memory." Shakespeare's Falstaff is a swindler, a drunkard, a liar, and very nearly a coward. His faults are redeemed in some measure by his wit and good temper. Queen Elizabeth, it is said, was greatly pleased with the character, and requested Shakespeare to introduce him into another play. His appearance in *Merry Wives of Windsor* was the result.

Fama, in Roman mythology, the goddess of rumor, of fame,—of evil and of good report. Fama is the daughter of Earth,—a slight, winged creature, swift of foot. Fama never sleeps. What she sees and hears she whispers to a few; then she speaks it more and more loudly to an ever widening circle of listeners, until heaven and earth have heard the news. She is represented with a trumpet. Virgil describes Fama in the *Aeneid:*

> Swift is her walk; more swift her winged haste—
> A monstrous phantom, horrible and vast.
> As many plumes as raise her lofty flight,
> So many piercing eyes enlarge her sight:
> Millions of op'ning mouths to Fame belong:
> And every mouth is furnish'd with a tongue;
> And round with list'ning ears the flying plague is hung.
> She fills the peaceful universe with cries:
> No slumbers ever close her wakeful eyes: . . .
> Talk is her bus'ness; and her chief delight
> To tell of prodigies, and cause affright.

Famine, făm′ĭn, general scarcity of food. Although it is allowable to speak of a garrison suffering from famine, the term is restricted by careful writers usually to a considerable territory and a large population. Famine is most likely to occur in case a dense population is dependent on a single product for a supply of food, and has limited means of obtaining food from outside. Under such circumstances a crop failure is followed by terrible suffering and loss of life. Some of the natural causes that bring about a loss of crops and subsequent famine are flooding, unusual frosts, drought, and insect plagues. Not infrequently, in time of war, a population has been prevented from planting. History records nearly four hundred grievous famines. We have no way of estimat-

ing the number that have occurred in prehistoric times and in remote localities. The Scriptures speak of several famines. The most noted is, of course, that during which Jacob and his sons took refuge in Egypt. The forethought of their kinsman, Joseph, had caused wheat to be stored up in granaries against the day of dire want.

The rice raisers of China and India have been particularly subject to famine. As late as 1877-8, 9,000,000 Chinese died for want of food. The Chinese suffered again in 1903. The British government has expended enormous sums in feeding the natives of India in time of want. In 1769-70 3,000,000 Hindus perished of starvation. In 1865-6 half as many more died. In 1877, the year also of the great Chinese famine, half a million starved to death. In 1901 the government distributed nearly $30,000,000 by way of relief. Contributions were sent from all parts of the world. Shiploads of flour, it may be remembered, were sent from the United States. In 1870-72 a quarter of the population of Persia, estimated by some at nearly 2,000,000, died of starvation. In 1846 the potato crop in Ireland failed. Despite the disbursement of $50,000,000 by the British Parliament and help from other countries, particularly America, it is estimated that Ireland lost 2,000,000 inhabitants. Burial was difficult, so many people died of famine. Hundreds of thousands of emigrants left the country for the United States and Canada. In 879 food was scarce throughout Europe. In 1125 half the population of Germany died for want of food.

The multiplication of railroads and canals, the greater certainty of navigation, owing to the use of steam in propelling ships, greater diversity of crops and greater intelligence in the distribution of food supplies, render it probable that famines will one day be brought under control. One of the greatest difficulties in the way at the present time is the extreme poverty of large masses of the population. In 1921 Russia suffered from the most disastrous famine of modern times due partly to drought and partly to the disorganized condition of the farming population. Thousands were saved from starvation by relief from other nations, a movement in which the United States took the leading part, furnishing over ninety per cent of the supplies. Other thousands perished before assistance arrived.

See IRISH FAMINE.

Fan, a light, swinging contrivance designed to give motion to the air. The Scriptures speak of using a fan for driving the chaff from a threshing floor. This, of course, would be necessary only in a country where a breeze was infrequent during the threshing season. The modern fanning mill, and the fan in a threshing machine, are improvements on this ancient method of winnowing grain.

A very different use of the fan is that of moving air for the sake of coolness. In India apartments are cooled by a long, swinging fan called a punka. It is suspended in a bamboo frame and is swung to and fro by a servant. Those who can afford the expense keep the punka going day and night. A somewhat similar contrivance is in use in the Southern United States, especially at meal time. It serves a double purpose of cooling the dining-room and of driving flies from the table. The punka has been replaced largely by the electric fan, now widely used.

In hot countries fans for cooling the face have been in use from remote ages. Sennacherib, the Assyrian, is represented in sculpture as attended by female servants who cooled his face with feather fans. The sculptures of ancient Thebes in Egypt show that the fan was in use for thousands of years before Christ. When the Prince of Wales, afterward Edward VII, visited India, he was presented with a heart-shaped fan having an ivory handle. It was of unknown age. It had been preserved in a temple by the Hindus and had been held in great veneration for generations. The ancient fans appear to have been made chiefly of feathers, fastened in wood or ivory handles.

Women's fans, carried partly for use and partly for ornament, are of ancient date. In Rome a handsome fan was a regular part of a bridal outfit. The invention of the women's folding fan is credited to

the Japanese. The Chinese are noted for the manufacture of this sort of fan. The ribs are made of ivory or bamboo, the web of rice paper. In the Middle Ages a Chinese fan of the more expensive sort was regarded as a fitting present from an ambassador to his queen. The Japanese are noted for the manufacture of light, durable fans, gayly decorated with colored flowers, butterflies, and human figures. Immense numbers are imported by the western nations.

Society fans came into general use, probably, about the time of Queen Elizabeth. Steele and Addison in the *Tatler* and the *Spectator* have several articles on the use of the fan by the London coquette. They are merciless in their criticisms of fan flirtation as then carried on. The poets of the day make frequent allusions to the fan. In speaking of the prevailing immodesty of conversation, Pope says:

The modest fan was lifted up no more;
And virgins smiled at what they blushed before.

During the seventeenth century Paris was the great European center of fan making. The ribs were made of ivory, and were ornamented with jewels. The web was made not infrequently of thin, transparent vellum. Fabulous prices were paid for some of the more expensive fans. Paris is still the leading city of the world in the manufacture of fans. So far as comfort and convenience are concerned, there is no fan that surpasses the ordinary palm leaf. Such fans come chiefly from the tropical regions of America and India. They are trimmed to shape. The edge is protected from fraying by binding with a slender strip of bamboo or rattan.

Fandango, an ancient national dance of Spain, particularly in the province of Andalusia. It may be of Moorish origin. It is danced in ¾ time by a single couple to the accompaniment of the guitar or tambourine, the dancers beating time with castanets, and the spectators by clapping their hands. It is popular among the peasantry, especially of an evening or on Sunday. The fandango has followed the Spanish-speaking people to Mexico and the South American states. The term is applied somewhat in ignorance to almost any sort of antic or sparring participated in by two people.

Faneuil (făn′ĕl) **Hall,** one of the landmarks of colonial Boston. It ranks with the Old South Meeting House and the Old State House. The original hall was given to the city by Peter Faneuil, a wealthy merchant who had made a fortune smuggling Jamaica rum. This hall was burned down in 1761. A new hall was erected by the city in 1762 and 1763. The funds were raised in part by lottery. The lower or basement floor was surrounded by wide sheds and provided quarters for a city market. The upper floor was used as a town hall. It was here that Otis, Sam Adams, and other fiery Revolutionary leaders addressed the citizens of Boston, gaining for the hall the name of the "Cradle of American Liberty." In 1805 the hall was enlarged and considerably altered. A fine interior gallery, resting on Doric columns, was constructed. Among noted orators of the nineteenth century who spoke from the old-fashioned rostrum, Webster, Sumner, Wendell Phillips, Choate, and Everett may be mentioned. The hall was completely renovated in 1900. Though considerably changed, it is not difficult to picture the surroundings amid which Sam Adams urged resistance to British authority. See BOSTON.

Faraday, Michael (1791-1867), a distinguished English chemist. His father was a blacksmith near London. He was apprenticed at an early age to a bookbinder, an occupation which gave him opportunity to read. Young Michael had few opportunities for an education, but managed to attend a series of popular lectures on chemistry given by Sir Humphry Davy. Faraday's notes attracted the lecturer's attention. To the young man's great delight, he was engaged as an assistant and traveled about setting up apparatus and getting everything ready for the lecture. Sir Humphry, the most noted chemist of the day, was wont to declare that his greatest discovery was "Mike" Faraday. Under his master's instruction, Faraday was the first to condense gases into liquids by pressure. He succeeded

Sir Humphry as professor of chemistry in the Royal Institute. Among his most noted publications are his *Lectures on the Chemical History of a Candle.* He also contributed to the study of glaciers, heat, ice, electricity, and magnetism. He is said to have contributed something new to almost every department of physics. As a lecturer he was very successful by reason of his charm of manner, simplicity of style, and facility in illustration. The great work of his life was a series of *Experimental Researches on Electricity,* published in *Philosophical Transactions.* See DAVY.

Farce, a comic dramatic performance in which the characters and incidents are grotesque and absurd. Sometimes a farce is in the form of an opera. It is then a musical farce, comic opera, opera bouffé, or burletta. See DRAMA; COMEDY.

Farce is that in poetry which grotesque is in a picture; the persons and actions of a farce are all unnatural, and the manners false.—Dryden.

Fargo, the largest city of the state of North Dakota. It is on the Red River of the North, two hundred fifty-four miles west of Duluth. Located as it is in the midst of a vast wheat-raising region, it is one of the greatest distributing centers for farm machinery in the United States. Various manufacturing interests, such as wood, iron, leather and clay-works, are locating plants here, and a large wholesale business is developing. Three railway systems supply transportation. Several colleges and academies are located there, among them Fargo College, the State Agricultural College, a Roman Catholic academy, and two large business colleges. Rebuilt since 1893, when it was almost destroyed by fire, it is a city of handsome buildings and well-paved streets, with a complete street car system. Its population in 1920 was 21,916.

Faribault, Minnesota, a manufacturing city and an educational center, is the county seat of Rice County. It is situated at the confluence of the Cannon and Straight rivers, 52 miles south of Saint Paul, and is served by the Great Western, Chicago, Rock Island & Pacific and Chicago, Milwaukee & Saint Paul railroads. It is situated in a region abounding in beautiful lakes. The manufacturing plants of Faribault produce shoes, pianos, wagons, gasoline engines, furniture, flour and wooden tubs. Here are located state institutions for the blind, deaf and dumb, and feeble-minded. Other institutions are the Shattuck School for Boys, St. Mary's School for Girls, Seabury Divinity School and the Bethlehem Academy for Girls. In 1920 the population was 11,089.

Farley, John Murphy, a cardinal of the Roman Catholic Church. He was born in Ireland in 1842, and educated at St. Marcartan's College, Monaghan; St. John's College, Fordham; St. Joseph's Seminary, Troy, New York; and the American College at Rome. He was ordained priest in Rome, June 11, 1870. He rose in the ranks of the church until, in 1902, he became the fourth Archbishop of New York and on November 27, 1911, he was elevated to the cardinalate. He is an author of distinction, having written several works on Catholic subjects. The volume which is the most widely known, is his *Life of Cardinal McCloskey.* Cardinal Farley died in 1918.

Farm, a tract of land devoted to raising stock and field crops. The United States census reports do not count gardens, truck patches under three acres, and uncultivated cattle ranges as farms.

The agricultural census of the United States for 1920 gives the following data:

Number of farms	6,149,343
Value of farm property	$77,924,100,338
Value of farm produce (1919)	$17,422,437,167

A comparison of the statistics of tenure for the years 1910 and 1920 shows that the number of farm operators increased by 86,841, or 1.4 per cent in ten years. In the same period, the acreage of farms held by owners increased from 598,554,617 to 636,775,015, or 6.4 per cent; while the acreage of farms held by tenants increased from 226,512,843 to 264,979,543, or 17.0 per cent. The total farm area increased in this period from 878,798,325 to 955,883,715 acres, or 8.8 per cent.

There was a decrease of 5.1 per cent in the number of farms of 20 acres or less between 1910 and 1920; an increase of 6.3 per cent in the number of farms between 20 and 49 acres; and an increase of 34.4 per cent in the number having an

area of 1,000 or more acres. The value of farm property increased 90.1 per cent during the same period.

The value of live stock products increased, from 1909 to 1919, 126.4 per cent, and the value of crops and miscellaneous products increased 182 per cent. This enormous increase is accounted for, mainly, by the fact that the price of farm produce was unusually high in 1919.

Farm Loans. See RURAL CREDITS.

Farmers' Alliance, an organization formed in 1888 by the fusion of two farmers' organizations known as The Wheel and the Farmers' Alliance. The full title of the new body was The National Farmers' Alliance and Cooperative Union of America, and its purpose was stated in this title. In 1891 this organization united with the Knights of Labor, and for Cooperative Union of America the words Industrial Union were substituted. Nonpartizan at the beginning, the union later went into politics, elected several governors, and otherwise wielded power. It reached the height of its influence in the latter part of the 19th century.

Farmers' Institutes, meetings of farmers and others held to inculcate improved methods of agriculture. These meetings take many forms. A typical institute occupies a day, an evening, and a day—five sessions in all. A force of specialists is engaged to provide a succession of lively, informal, instructive talks on topics of timely and local interest. Stump pulling, tiling, open ditching, fallow, the dust blanket, green manure, commercial fertilizers, soil inoculation, seed testing, plant breeding, rotation of crops, alfalfa, kaffir corn, curing clover, silos, corn shellers, improved varieties of seed, stock judging, veterinary practice, stabling, ventilating, breaking to halter and to harness, testing for butter-fat, butter breeds and beef breeds, feeding, breeding, tests for tuberculosis, wool, mutton, lambing, docking, dipping, shearing, foot rot, hog cholera, poultry houses, chickens for eggs and poultry for market, quack grass, grafting, pruning, seedlings, picking, marketing, coöperating, and roadmaking are only a few of the many topics which live institute workers handle with vivacity and a deal of good natured back talk; for farmers are an informal, hard-headed lot, not perhaps unwilling to learn, and yet decidedly unwilling to accept theory. The most effective work is done by intelligent men who are able to relate their own experiences forcefully. A well balanced program contains numbers pertaining to household management. Not infrequently a woman holds auxiliary meetings for farmers' wives.

The institute idea is over half a century old. As early as 1853 farmers' institutes were suggested by the secretary of the Massachusetts Board of Agriculture. In 1871 meetings of this sort were held in Illinois and in Iowa. In the same year Vermont and New Hampshire provided for annual institutes. Beginning with 1876, Michigan has maintained a continuous system of farmers' institutes. In 1920, 10,000 institutes, large and small, were held in thirty-four states and territories, and were attended by no less than 2,300,000 persons. The expense is borne largely by the several states, which make large annual appropriations for the purpose. In some states the entire management is vested in a central bureau or director, connected not infrequently with the state agricultural college.

Farmer's Satin, a lining material woven with cotton warp and worsted weft by the "satin" method. This produces a smooth surface which is finished with a high luster. It is used for lining men's readymade garments, and for other linings where durability is required. See SATIN.

Farnese, fär-nā′sĕ, the name of an illustrious Italian family, the origin of which can be traced to the middle of the thirteenth century. Alessandro Farnese, Pope Paul III, filled the papal chair 1534-1549. Alessandro Farnese, son of Ottavio Farnese, Duke of Parma, was a distinguished general, almost worshiped by his soldiery. Elizabeth Farnese became the wife of Philip V of Spain. The Farnese family became extinct with Antonio Farnese, who died in 1731. The name Farnese, however, is connected with several cele-

brated works of art. The Farnese Palace, an edifice erected by Pope Paul III before he was raised to the holy see, is one of the finest in Rome. It is adorned with frescoes by Annibale Caracci. A number of pieces of antique sculpture, formerly in this palace, are now preserved in the National Gallery at Naples and are known as the Farnese collection. These are: The Farnese Bull; the Farnese Flora; the Farnese Minerva; the Farnese Homer; the Farnese Juno; the Farnese Hercules; and the Farnese Bacchus. During the period of Rome's greatest splendor, an immense number of works of art were brought to the city from other countries. Many of these antique statues were lost for hundreds of years, to be rediscovered, perhaps, in excavating some ruin. The Farnese Bull, which is the most celebrated statue of the Farnese collection, was dug up from the ruins of the baths of Caracalla in the sixteenth century. The Hercules was found in the same ruins, while the Minerva was discovered at Velletri, Italy. The Farnesina is a palace at Trastevere, noted especially for the frescoes of Raphael which adorn it.

Farnese (fär-nā′sĕ) **Bull,** a celebrated group of statuary. It was found in excavating the baths of Caracalla in 1546, and placed in the Farnese Palace at Rome. The group is believed to date from the third century B. C., and to have been the work of Apollonius and Tauriscus, sculptors of the Rhodian School. It represents the punishment of Dirce for her treatment of Antiope. According to legend, Antiope's sons bound Dirce to the horns of a wild bull. In 1786 the sculptured group was sent from the Farnese Palace to the National Museum at Naples, where it is now preserved. The figures of the group are of colossal size, and it is considered the "most elaborate and dramatic group to be found among the monuments of Greek art." See DIRCE; ANTIOPE; FARNESE.

Faroe Islands, a group of twenty-two islands situated in the Atlantic between the Shetlands and Iceland on the sixty-second degree of north latitude. Area, 540 square miles. Population (1906), 16,349.. The group belongs to Denmark. The language is a dialect of the Norse. The shores of the islands are precipitous. The climate permits hardy ponies and cattle to run out the year around. Barley, turnips, and potatoes are cultivated. The inhabitants gather the eggs and feathers of seafowl from the cliffs, engage in fishing, and raise sheep. Two representatives are sent to the Danish Parliament.

Farquhar, fär′kwär, **George** (1678-1707), an Irish dramatist. He was born at Londonderry and received his education at Dublin. He tried acting, but without success. His first play was *Love in a Bottle.* It was successfully produced at Drury Lane in 1699. Other plays are *The Recruiting Officer, A Constant Couple, Sir Harry Wildair, The Stage Coach, The Beaux' Stratagem,* and *The Way to Win Him.* Farquhar died in great poverty. Three of his plays, *The Way to Win Him, The Recruiting Officer,* and *The Beaux' Stratagem,* are still favorites on the stage. Farquhar's plays are natural and witty, full of incident and action.

Farquhar is an artist in stage effect, an Irishman, with the Irish sportiveness, and an agreeable diversity.—Welsh.

Farragut, David Glasgow (1801-1870), an American naval commander. Farragut was born at Campbell Station, East Tennessee, July 5, 1801, and died August 14, 1870, at Portsmouth, New Hampshire. In 1810 Farragut entered the navy as a midshipman, serving under Captain David Porter. In 1823 he took a gallant part in a battle between the American naval forces under Commodore Porter and a band of pirates who were sheltering in Cuba. This was the end of piracy in the West Indies. Rising by regular routine, the Civil War found Farragut a captain living at Norfolk, Virginia. Although his domestic ties were with the South, Farragut removed his family to the North, and remained in the United States navy. His first orders of importance were to blockade the mouth of the Mississippi and capture New Orleans. After a grand defense and the sinking of ships on both sides, Farragut won a

brilliant victory. He silenced Fort St. Philip and Fort Jackson on the banks of the Mississippi, and took possession of New Orleans April 24, 1862. During the following summer, he opened the Mississippi for some distance above New Orleans, and March 14, 1863, he passed Port Hudson under a terrible fire of artillery and opened communication with Flag Officer Porter on the upper Mississippi. He was made rear admiral for this service. July 9, Port Hudson fell, and the entire Mississippi River was open. The control of the Mississippi now devolved upon Rear Admiral Porter. August 5, 1864, Rear Admiral Farragut, with four iron-clads and fourteen wooden vessels, won the victory of Mobile Bay. During the fight Farragut was stationed high up in the main rigging of his flag-ship, whence the expression, "Farragut at the masthead." Congress created the grade of admiral, a position to which Farragut was appointed in recognition of his gallant services, which in view of the few who have held it was a marked distinction.

Farrar, Geraldine (1882-), a famous American operatic soprano who has also achieved success as a moving picture actress. She was born at Melrose, Mass., and received her musical training in Paris and Berlin. Farrar made her debut in Berlin in 1901, as Marguerite in *Faust*. She became a member of the Berlin Royal Opera Company, but since 1906 she has been a member of the Metropolitan Opera Company of New York and frequently appeared in other cities. Her roles include Madame Butterfly, Juliet, Marguerite, Manon, Violetta, and others.

Farthing, a British coin. The word means a "fourth part," *i. e.,* of a penny, or half a cent. A halfpenny farthing is the fourth part of a halfpenny. In Matthew x:29, "Are not two sparrows sold for a farthing?" reference is made to a small Roman coin worth one-tenth of a Roman penny. Farthings were coined of silver at one time. Farthings were also made by cutting a penny twice crosswise. Copper farthings have been coined since 1665. See COIN; MINT.

Fasces. See BIRCH.

Fasts, Religious, were common in an early period of the human race, and are mentioned even in the earliest histories. The custom prevailed among the Aztecs and Toltecs of Mexico, and is still practiced among many peoples, notably the Pacific Islanders. Fasts, more or less prolonged, have been a requirement in many of the mystic cults, especially before initiation into their mysteries. In the seventh century before Christ the Orphic societies in Greece demanded fasting. It was also a custom among the ancient Romans. Among the Jews fasting was sometimes spontaneous, sometimes obligatory. It was undertaken to arose the pity of the Highest, to express sorrow for the dead, to avert national disaster, etc. It was also thought to spiritualize the faster and make him fit for some special revelation.

In modern times fasting is often prescribed on memorial days among the Jews, and implies entire abstinence from food from daybreak till the appearance of the first three stars, except on the Day of Atonement, when the period begins with the sunset of the preceding day. In the Greek Church fasting is strictly kept, and there are many vigils prescribed as a preparation for great church festivals. In the Roman Catholic Church fasting is considered to be primarily within the dispensation of the Pope; for practical purposes in the bishops; and, for individual cases in parish priests and confessors.

Fasting, going without food and drink, either wholly or in part. This is sometimes done either for the purpose of reducing weight, or for the cure of some disease. To cure many forms of disease physicians recommend abstention from certain articles of food, especially meat, and advise a vegetable diet alone, a milk diet, or other changes in the diet. But a total abstinence from food for the purpose of reducing the weight is dangerous, and should never be undertaken except upon the advice of a physician.

Animals that hibernate are capable of sustaining life for indefinite periods during the winter sleep, but a warm-blooded animal when active cannot endure fasting to any such extent as the reptiles, in many

of which the natural state of existence is one of long periods between taking food. If for any reason a person has fasted, great caution must be taken in going back to the usual diet, some physicians advising nothing but orange juice, or perhaps milk. An important point is the removal of any chill of the body by gradually applied heat, for animal heat is reduced in a large degree during fasting, and chills, fever, restlessness, and sometimes delirum, occur. See STARVATION.

Fat, in the arts and sciences, any substance capable of making a grease spot on paper. In popular usage a fat differs from an oil in being solid at ordinary temperatures. The chemist regards any substance as a fat that will unite with lye to make soap. In their chemical makeup, fats consist of hydrogen, carbon, and oxygen—the same elements of which sugar and starch are composed, although in different proportions. The percentage of carbon is higher. Fats contain glycerin. Plants make fat out of the substances which they draw from the earth and air. Animals store up the fat which they obtain from their food. They also manufacture fat,—especially from starches and sugars. Some fat is necessary to animal life in order to give suppleness to the muscles and other tissues. In persons and animals alike, the tendency to store up fat is greatest in the young, and in those who have reached middle life. A certain variety of sheep is remarkable for storing up fat in the tail to the extent of thirty or forty pounds. The bear and other hibernating animals store up fat in the autumn before going into sleeping quarters for the winter. The system draws upon this fat for support. The camel has the faculty of storing up fat in its hump, to be drawn upon during long journeys. When exhausted by travel and fasting, the hump wrinkles down into a flabby fraction of its former size.

Fat is a producer of heat, rather than of strength. The farther people live from the tropics, other conditions being equal, the fonder they are of butter and grease. The Eskimo, for instance, eats great chunks of raw blubber with delight.

Fatamorgana. See MIRAGE.

Fates, The, in mythology, the three goddesses of destiny. According to one account, they are the daughters of Night; according to another, they are the daughters of Zeus. In art, they are represented standing in a group, armed with the distaff and shears. Clotho (klō′thō), the spinner, draws out the thread of human life; Lachesis (lak′e-sis), the presider over lots and games of chance, twists its bright and dark lines together and determines its length; when it has reached its destined length, Atropos (at′rō-pos), the inevitable, clips off the thread with her shears. As is appropriate, they are represented as women of dark and severe countenance.

> Twist ye, twine ye! even so,
> Mingle shades of joy and woe,
> Hope, and fear, and peace, and strife,
> In the thread of human life. —Scott.

Fathers, in ecclesiastical history, the bishops of the early churches, whose writings are regarded as authoritative. First of all are the apostles. Athanasius, Basil, Gregory, and Chrysostom are considered fathers of the Greek Church; Jerome, Ambrose, Augustine, and Gregory the Great, fathers of the Roman Church. Other early writers, as Origen, have scarcely less influence. In a general sense, the term father or fathers is used to indicate the original promoter or promoters of an enterprise. Thus the early settlers of Plymouth are called the Pilgrim Fathers. Douglas was considered the Father of Squatter Sovereignty. Well known titles of this sort are:

Father of Angling—Isaak Walton.
Father of Comedy—Aristophanes.
Father of his Country—George Washington.
Father of Democracy—Thomas Jefferson.
Father of Dentistry—Pierre Fauchard.
Father of English Poetry—Chaucer.
Father of English Prose—Roger Ascham.
Father of Epic Poetry—Homer.
Father of German Literature—Lessing.
Father of Greek Tragedy—Aeschylus.
Father of History—Herodotus.
Father of Lies—Satan.
Father of Medicine—Hippocrates.
Father of Orthodoxy—Athanasius.
Father of Ridicule—Rabelais.
Father of the Faithful—Abraham.
Father of Waters—The Mississippi.

Fatigue, commonly, weariness from exertion. The term is also applied to cells and organisms whose power to function has diminished. Fatigue may be phyisical or mental. In either case it follows a long period of effort. It may be local as in case of the arm of a blacksmith or it may be general as in case of a man who has followed the plow for several hours. Physical fatigue is caused by less effort than mental fatigue. One can endure a longer period of mental application, but mental fatigue may require a longer period of rest.

Causes. Experiments show that muscular fatigue is caused by the accumulation of poisonous substances, which are thrown off by the muscles in action. This waste accumulates more rapidly than it can be eliminated by the circulation. A period of rest restores the muscles to their normal condition. Another cause is lack of nourishment. Unless the blood contains a normal supply of nutriment one is incapable of prolonged application. The causes of mental fatigue, though not so well understood, are considered to be similar to those of muscular fatigue.

Evil Effects. Fatigue arising from our ordinary duties is not injurious, since the system is soon restored to its normal conditions by a period of rest. But fatigue may be carried to a point where restoration becomes difficult. When such a condition arises it should receive immediate attention. Fatigue is nature's warning that rest is needed. Fatigue arising from the discharge of our daily duties is readily overcome by a period of rest, but fatigue arising from over-exertion requires a much longer period of rest and too often it is not heeded until a complete nervous breakdown, from which it may require years to recover, occurs.

Excessive fatigue is manifested by abnormal nervousness in some and by lethargy in others. Loss of memory, inability to act quickly, slowness of perception and weakness of the will power results from over-fatigue. It is the tired and nervous teacher who unjustly punishes the child; the over-worked engineer who runs past the signal; the exhausted machinist who is injured, and the tired man who falls when tempted.

Remedies. In extreme cases it may be necessary to exert oneself to the point of exhaustion. But in general, excessive fatigue is both injurious and wasteful. We cannot complete our daily task when tired; neither can we do our best work. We should use our periods of rest as conscientiously as we do our periods of work. Sleep is nature's best restorer. Everyone should have the necessary amount of sleep. Pleasant surroundings prevent fatigue. The most progressive employers of labor recognize this and provide pleasant surroundings and cheerful working conditions.

Change of occupation lessens fatigue because it brings new muscles and new trends of thought into play. Physical exercise to the point of muscular fatigue is often the best means of overcoming mental fatigue. Habit lessens fatigue. We soon become tired when we enter upon a new occupation, but as we become accustomed to the work, in other words, form the habit of doing it, fatigue diminishes. Interest in one's work lessens fatigue. He who dislikes his job in confronted by a double task—overcoming his dislike and doing the work. Fear, anger, jealousy and other malevolent passions are exhausting and should not be entertained. Stimulants, narcotics and numerous so-called nerve specifics weaken the nervous system and should be avoided.

Fatigue in School Children. Young children are unable to sustain prolonged application. School programs, especially in the primary grades, should provide for frequent change of work and change of position. Fatigue in children may be quickly detected because it is seen in slowness of work, restlessness and lack of attention. During adolescence, rapid growth often causes fatigue, and the pupil is physically unable to do his work. A child in this condition needs care, not censure. Possibly he will gain time by remaining out of school for a brief period.

Fatima, fä'tē-mä, as commonly known, Bluebeard's seventh wife. There are other characters of this name. Mohammed's

favorite daughter was Fatima. She was born at Mecca in 606 and died at Medina in 632. The Prophet called her one of the four perfect women. In the story of *Aladdin,* in *Arabian Nights,* the enchantress was named Fatima. Bluebeard's wife Fatima, was "neither proud nor vain," in fact she was a very perfect wife, except that she was too inquisitive. Her one fault nearly cost her her life. She achieved distinction as being the only one of Bluebeard's wives who was clever enough to escape being murdered. See BLUEBEARD.

Faunus, in Roman mythology, a king of Latium. He was the grandson of Saturn, and was worshiped as the god of agriculture and the protector of shepherds. He came to be identified at a later period with the Greek Pan. His wife was Fauna. As Faunus manifested himself in various ways, the idea of fauni or fauns arose. They were frolicsome woodland deities somewhat akin to satyrs. They are represented as having the legs and feet of goats and the rest of the body human. They had grotesque pointed ears. The country people sacrificed lambs and kids to them with all solemnity. They are represented as fond of sport and dancing.

Faure, fōr, **Felix** (1841-1899), a French statesman. He was a native of Paris and died in that city. Faure was for a time a tanner, and later a shipowner of Havre. He commanded a company of volunteers in the Franco-Prussian War, and was decorated with the ribbon of the Legion of Honor. In 1881 he was elected to the French Assembly. A knowledge of shipping and colonial affairs gained at Havre led to his appointment as cabinet minister and minister of marine. In 1895 he was elected president. After two attempts on his life by Nihilists, he died in office.

Faust, fowst, **Doctor Johann** (1480-1538), a German magician. He was a native of Wurtemberg. There is no doubt that such a man lived in Germany, and that he was credited with the possession of magic arts and of living in intimate association with evil spirits. In other words, he was considered a master of the black art. According to the legend of Dr. Faust, however, he was a youth of large fortune who flung away his money and gave himself over to a wild life. He then began to study magic and made a bargain with Satan, according to which he was to have wealth and pleasure for twenty-four years. At the end of this time his soul was to belong to the Evil One. Faust signed a contract in his own blood to the effect that: "(1) He shall renounce God and all celestial hosts; (2) He shall be an enemy of all mankind; (3) He shall not obey priests; (4) He shall not go to church, nor partake of the holy sacraments; (5) He shall hate and shun wedlock." Mephistopheles, a devil, "who liked to live among men," went with Faust and helped him to riot in every kind of gross pleasure for twenty-four years as agreed. At the end of that time, Satan appeared in a hideous form at midnight and bore Faust away to everlasting torment. The legend has been used as literary material by many writers in Germany and elsewhere. In all perhaps 200 or 300 volumes have the whole or a part of their space devoted to the Faust legend and his black arts. This Dr. Faust is the basis of Goethe's *Faust,* a production which is considered Goethe's greatest work. It is needless to add that it would be a bold writer who would undertake to improve Goethe's use of the legend. See GOETHE.

Favre, fävr, **Jules** (1809-1880), a French statesman. He was born at Lyons and died at Versailles. He studied law. His forte was the defense of political prisoners. He was a natural revolutionist. He took part in the changes of 1830, 1848, and 1870. He was one of the commissioners who were obliged to accept Bismarck's terms of peace. Favre pleaded hard to retain Alsace-Lorraine, but Bismarck was immovable. Favre was elected to the French Academy in 1869. He wrote a number of books of no profound interest or scholarship. See FRANCO-PRUSSIAN WAR.

Fawkes, Guy. See GUNPOWDER PLOT.

Fay. See FAIRY.

Fayum, or Fayoum, a district of ancient Egypt lying west of the Nile and

southwest of Cairo. It is a circular basin about thirty miles in diameter. It lies below the surface of the Libyan desert, and is connected with the valley of the Nile by a narrow pass threaded by an ancient canal. It was and is well watered. It contains about 500 square miles and sustains a population of a quarter of a million persons. Lake Birket lies in the northwestern part. Herodotus described a vast reservoir thirty miles in circumference, used to store the waters of the Nile, Lake Moeris, he called it. The closest examination fails to locate the embankment of any such lake satisfactorily. It is believed he may have visited the country in a time of overflow and have been deceived by local dikes. The soil produces crops of wheat, flax, hemp, rice, cotton, and sugar-cane; orchard fruits, including oranges, peaches, pomegranates, olives, figs, and grapes are abundant. Roses grow luxuriantly. Garden vegetables are plentiful. Archaeological finds of great antiquity have been located in the Fayum. A famous palace, known as the Labyrinth, has given up many treasures.

See EGYPT; NILE.

Feathers, the plumage or covering of a bird. All birds have feathers. No other animal has feathers. The nearest approach to a feather is said to be the quill of a porcupine. The young of scratching birds, such as domestic chickens, turkeys, and the whole grouse family, emerge from the egg clothed with feathers. The same is true of the duck tribe, and of all wading birds, save the herons and their allies. The young are able to run about almost as soon as hatched. The young of singing birds, and of nearly all birds that nest in tree-tops, are naked when hatched, and remain helpless in the nest until their feathers grow.

Feathers are the lightest and the warmest covering which nature has furnished an animal. The plumage of many birds, particularly of waterfowl, is naturally waterproof. Birds assist nature in this respect by dressing their feathers with oil pressed by the beak from a small oil pouch situated on the rump. Feathers are also a non-conductor of electricity. A feather bed is considered a safe place during a thunder storm.

Like a hair, each feather grows in a pit or pouch of its own. The lower portion, which is round and hollow, is known as a quill. For centuries before the invention of the steel pen, a pen made from the quill of the goose was used by writers. One of the requisites of a schoolmaster was skill in sharpening or mending these pens. This he did with a small penknife made for the purpose. The square central portion leading out from the quill is the shaft. The lighter portion growing on either side of the shaft is the web. The American Indians, as well as the English archers, were wont to split the shaft of a feather carefully and glue the halves to the opposite sides of their arrows to give them a more steady, accurate flight.

The feathers of a bird grow in numerous tracts separated by bare spaces. The feathers of the wing, for instance, belong to seven distinct tracts. Naming these from the bend of the wing backward, they are the lesser coverts, the middle coverts, the greater coverts, the secondaries, and the primaries; while above the greater coverts and secondaries, that is toward the back, are the scapulars and tertiaries. Other groups of feathers are mapped off in the same way.

In variety of coloring, feathers vie with flowers. While flowers may excel in softness and delicacy, plumage surpasses in brilliancy and sheen. Chapman considers a chart of thirty colors necessary to identify the plumage of the birds of the Northeastern States. Special names are given to markings, a few of which it is well to know. A line of color following the shaft, and spreading out narrowly to the web on either side, is a streak. A band of color crossing web and shaft is a bar. A local area of color is called a spot. A line of color following the outer edge of the web is a margin.

The peculiarities of feathers have not failed to attract notice. "As light as a feather" is a proverbial expression. "Birds of a feather flock together" is but another rendering of the idea that "one is known by the company he keeps." Many

birds use feathers to line their nests. A trustee or guardian who appropriates to his own use property that has been left in his charge is said to "feather his own nest." A newly acquired honor is a "feather in one's cap." Rowers are said to "feather their oars," when the oar is lifted deftly so that the water running from it forms a sort of web, like that of a feather. "To show the white feather" is to exhibit cowardice—to run away.

Feathers are utilized in a number of ways. The small, soft feathers, and the down are used for beds, pillows, and the filling of comfortables. Feathers of all sizes are used for purposes of ornamentation, especially in the attire of women. The smaller feathers are made into boas, muffs, caps, and band trimming for gowns and suits. The larger sorts are employed for decorating hats, bonnets, and various headdresses. Many feathers are used in their natural form and color; others are dyed, trimmed, cut, pieced, and grouped in endless variety. A straight, stiff, wing feather, including technically the quill, the shaft, and the webs, more or less trimmed, is called by milliners a quill. Quills are used singly or in pairs, and are employed where a jaunty effect is desired. The full wings of many birds, the breast, and the tail feathers are used in many combinations. Even the entire bird may be seen on hat or bonnet. The large birds whose feathers are of commercial importance are the ostrich, adjutant, rhea, emu, osprey, egret, heron, bird of paradise, swan, turkey, peacock, pheasant, ibis, eagle, and grebe. The number of small birds whose plumage is desirable is almost unlimited.

Ostrich feathers are the handsomest and most valuable of all feathers. The best are the long wing plumes, of which each wing furnishes twenty-six from five to twenty-two inches in length. On the male bird these are pure white, with occasional markings of black; on the female they show slight shadings of gray and ecru. Each wing furnishes seventy-five short feathers known as tips. The body feathers are black, or black and white. The tail furnishes sixty-five fine feathers, white shading into ivory. At the plucking season the birds are driven into a kraal or pen which opens into a plucking box. Into this box the ostriches are driven one by one. The box is so small that the bird can neither turn nor move about. Two workmen cut the feathers with shears.

See OSTRICH; HAIR.

February, the second month of the year. In the old Roman calendar it was the last month of the year. The name is derived from a Roman word, meaning to purify, February being the season of the year when people were wont to purify themselves prior to the approaching religious festivities. It is allowed but twenty-eight days, with an additional day in leap year, or the year the number of which is divisible by four; save that, in the year completing a century, a day is not added unless the year be divisible by four hundred. The shortness of the month is due to the fact that two days were stolen from it to lengthen the months of July and August, named in honor of the Roman emperors, Julius and Augustus. Several days of February are especially noted. The second is Candlemas Day, one of the quarter days in which rents are due in Scotland; the fourteenth is St. Valentine's Day. Locally in the United States, the second of February is called Groundhog or Woodchuck Day. The saying goes that on this day the woodchuck comes up and looks about him. If he can see his shadow, that is, if the day is bright and clear, he goes back to his burrow for six weeks. At the end of this period, spring may be expected. See CALENDAR.

Federal Reserve Board. See BANKS.

Federal Trade Commission, a United States government commission whose function is to make frequent and exhaustive investigation of business interests; to suggest safe measures for business houses to adopt; to keep the business men of the nation informed on matters relating to foreign trade; to investigate corporations in order to learn whether they are violating any of the provisions of anti-trust legislation; to investigate interstate corporations, except banks and common carriers; and to make suggestions to Congress regarding legislation that would be bene-

BIRDS OF BRILLIANT PLUMAGE

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Fechner, Gustav Theodor (1801-87), a German philosopher and physicist, was born in the village of Gross-Särchen, Prussia. After graduating from the University of Leipzig, taking the degree of doctor of medicine, he took up the study of theoretical and experimental physics. He made valuable researches and is known as the founder of modern psychology and psychophysics. From 1838 to 1840 he devoted himself to studies in the sphere of physiological optics. During this period he also published, under the pseudonym of *Dr. Mises,* a series of satirical and humorous essays among which was the *Proof that the Moon is Made of Iodine,* being a sharp criticism of the existing materia medica, another being the *Comparative Anatomy of the Angels.* About this time Fechner suffered a nervous breakdown and was confined to the sick room, and was threatened with total blindness and insanity, from which he completely recovered. He now took up the study of ethics and philosophy, which resulted in the publication of a number of books, among them being his *Three Motives and Grounds of Faith,* this making him eminent; and works of purely scientific topics, such as his *Textbook of Experimental Physics,* and *Elements of Psychophysics.*

Fechner had long devoted himself to the study of pyschophysical problems, and when his *Elements of Psychophysics* was published in 1860 it evoked lively discussion and much criticism, but Fechner stoutly stood his ground and made a brilliant defense of his position. He published several brochures in reply to objections made by Helmholtz, Brentano and others. The remaining years of his life he devoted to the study of esthetics and psychology.

While the general philosophy of Fechner did not receive as much attention as it merited, his work in esthetics has been considered very valuable. His fame, however, rests upon his work in psychophysics. In his work on this subject he laid the foundations for an exact psychology. He also worked out and elaborated a series of psychophysical measurement methods which are yet in use in psychological laboratories and generally brought to exact and workable methods theories which had before that been but a chaos of individual theories and separate observations.

Federal Council of the Churches of Christ in America, a body founded in 1908, for the purpose of cooperating in effective service, and composed of thirty evangelical denominations, these embracing 140,000 local churches and 18,000,000 members. The object of the Council is to express fellowship and unity in the Christian Church and to secure a broader influence for the churches of Christ in all those matters that pertain to the moral and social condition of the people. The Council meets quadrenially and its executive officers annually. The following commissions carry on the work: The church and social service, evangelism, Christian education, temperance, church and country life, international justice and good will, relations with the orient, relations with France and Belgium, relations with religious bodies in Europe, editorial council religious press, interracial relations, and the committees on Foreign Missions and Home Missions. The Council has made a study of religion as affected by the war, publishing it under the title *Christian Unity, Its Principles and Possibilities.*

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ficial to the commercial interests of the country.

The Commission was created by an act of Congress in 1914. It consists of five members appointed by the President for terms of seven years, not more than three members to belong to the same political party. Its orders are enforced through the United States Circuit Court of Appeals, which also has jurisdiction in appeals wherein points of law are involved.

Federalist, a series of political essays. Between the 27th of October, 1787, and the 2d of April, 1788, seventy-seven essays were published in the *Independent Journal* of New York City. These essays were written by Alexander Hamilton, James Madison, and John Jay, over the signature of "Publius," and were addressed "to the people of the State of New York," with the purpose of influencing the voters of New York to ratify the new Constitution of the United States. These essays, with nine others, were afterward published in a volume now well known as the *Federalist.* Their influence at the time was considerable. They are now of importance as showing the political thought of Hamilton's day, and the views of contemporaries upon the Constitution. Fifty-one of the essays were written by Hamilton, twenty-nine by Madison, and five by Jay.

Federalist Party, a political party of the United States. The Federalists became the leading party under the administration of George Washington. They elected John Adams, but were defeated by the election of Thomas Jefferson to the presidency. The party was in favor of a strong central government. The Federalists were very much injured by the famous Hartford Convention which opposed the War of 1812 and had the reputation of planning secession. During the following administration, that of James Monroe, the Federalists were lost sight of entirely. See DEMOCRATIC PARTY.

Federation of Labor, The American, an alliance of international and other trade unions. The term international is used to include Canadian and other North American locals. The present organization grew out of an older federation. It took the present form in 1886. Friction had existed for some time between the Knights of Labor and the stronger trades unions. The American Federation was organized on the plan of leaving to each trade the direction of its own affairs and the organization of its own union. The iron molders, for instance, have many local unions; these form the International Iron Molders Union, which, in turn, is a member of the American Federation of Labor. New unions of iron workers are chartered by the International Union, not by the Federation. Rules and regulations for the iron workers are made by their own organization, not by the Federation.

Similar relations exist between the Federation and national or international unions of cigarmakers, carpenters, painters, printers, bakers, and over a hundred other trades. The American Federation of Labor favors the "local trade union composed of members following a single vocation and attached to a national trade union." In fact, the Federation is a creation of the national and international trade unions and is what they make it. Where the workmen of a given trade are too few to form a local union, the Federation organizes a mixed labor union, the members of which are encouraged to form trade unions as soon as their numbers warrant such a step.

In 1922 the Federation comprised 111 national and international unions, representing 34,000 local unions, with 5 departments, 40 state branches, 983 city centrals, and 799 local and Federal trade unions. National headquarters are maintained in the A. F. of L. Building, Washington, D. C. The building trades, metal trades, mining, railroad and union label trades departments are all at Washington. State branches and central bodies of the Federation are maintained for legislative and educational purposes, and have no power to call strikes or negotiate wages or working conditions. Total membership in 1922 was about 4,000,000.

An annual convention is held. The national and international organizations are entitled to one delegate for each 4,000 members or fraction thereof. Other or

ganizations are allotted one delegate each. The official organ is the *American Federationist,* edited by Samuel J. Gompers, president of the Federation, who has been devoted to its interests and public affairs for many years, serving most of the time without pay.

In 1905, the Federation decided that "Party politics, whether they be Democratic, Republican, Socialistic, Populistic, Prohibition, or any other, shall have no place in the conventions of American Federation of Labor." The following are a few of the declarations upon which the American Federation of Labor appeals to all working people to organize, unite, federate, and coöperate to cement the bonds of fraternity:

1. The abolition of all forms of involuntary servitude, except as a punishment for crime.
2. Free schools, free text-books, and compulsory education.
3. Unrelenting protest against the issuance and abuse of injunction process in labor disputes.
4. A workday of not more than eight hours in the twenty-four hour day.
5. A strict recognition of not over eight hours per day on all federal, state, or municipal work, and at not less than the prevailing per diem wage rate of the class of employment in the vicinity where the work is performed.
6. Release from employment one day in seven.
7. The abolition of the contract system on public work.
8. The municipal ownership of public utilities.
9. The abolition of the sweat-shop system.
10. Sanitary inspection of factory, workshop, mine, and home.
11. Liability of employers, for injury to body or loss of life.
12. The nationalization of telegraph and telephone.
13. The passage of anti-child labor laws in states where they do not exist and rigid defense of them where they have been enacted into law.
14. Woman suffrage coequal with man suffrage.
15. Suitable and plentiful playgrounds for children in all cities.
16. The initiative and referendum and the imperative mandate and right of recall.
17. Continued agitation for the public bath system in all cities.
18. Qualifications in permits to build, of all cities and towns, that there shall be bathrooms and bathroom attachments in all houses or compartments used for habitation.
19. A system of finance whereby money shall be issued exclusively by the government, with such regulations and restrictions as will protect it from manipulation by the banking interests for their own private gain.
20. A system of United States government postal savings banks.

The conventions from year to year pass resolutions calling for needed legislation. Legislative committees of the Federation have aided in securing the passage of the national eight-hour law, Chinese exclusion, the state initiative and referendum, anti-trust legislation, anti-injunction laws, and the abolition of convict and imported contract labor. Much of the success of the Federation has been due to the retention of trusted officials, refraining from interference with the internal affairs of the various trade unions, and not attempting to do the impossible.

Feeble-minded, Schools for the, schools in which the mentally defective are cared for and taught. The United States Commissioner of Education reported for the year 1909 and 1910 forty-one such institutions of which twenty-five were under state control, while sixteen were privately maintained. The twenty-five public institutions had 16,678 inmates. Up to the year 1848 the feeble-minded were either kept at home or sent to almshouses or insane asylums. Physicians who saw the suffering often endured by such persons, inaugurated the movement which resulted in the establishment of separate institutions for such unfortunates. There are two distinct departments in these institutions; the asylum, offering home and care and so much of happiness as may be to those who have received what education they are capable of, and the school, for educating the young. This education is of a practical character. In the majority of cases the pupil must spend his life in the institution but he has the same right to such education and training as will enable him to get the most out of that life, as has the brightest and most gifted child on earth. He is trained, therefore, to useful occupation, to become, so far as may be, self-supporting, to help others and to enjoy their society,—in fact, to live his necessarily circumscribed life as successfully as the more fortunate live theirs. Many

mothers and fathers, feeling that none but themselves should care for these poor "innocents," keep such children at home until the time at which they may be helped has passed. The fact that in the majority of cases a child who has lived at one of these institutions is unhappy elsewhere is sufficient proof that it is the best place. And while the majority are not cured, that is, do not become able to take their places in the outside world, with those fully endowed, still the improvement, physical and mental, and in disposition, made often by a few years of competent care and instruction, is so remarkable that were the matter investigated a much larger per cent of the feeble-minded in our country would be found in the institutions established for their care.

Feeding of School Children, The, lunches provided for school children. American readers brought up in a land of abundant food are familiar, it may be, with lunches provided at cost by school authorities as a matter of convenience. Lunch counters are maintained in many large city high schools where a light midday lunch may be had for a few cents. In large European cities thousands of small children come to school without breakfast because there is no breakfast at home. When the public schools of London were opened and the children of the slums were required to attend, this in 1870 and following years, it was found that children by the hundreds were unable to fix their minds for sheer want of food. Permission was obtained to open school kitchens in the basements of the school buildings. Funds were obtained to provide lunches. The affair was managed in systematic manner. Tickets were given the hungry. About ten o'clock the children filed off to the basement, tickets in hand. As they passed a table each child took a tin cup. As they filed past the servers a child proffering one ticket received a generous ladle of hot soup. The holder of two tickets got, in addition, a slice of bread, and the little Croesus with three tickets received a cube of beef to float in his soup. The soup was far too precious for any jostling. The children passed with care to benches, sipped their soup, ate their bread to the tiniest crumb, divided their meat with less fortunate neighbors, and returned to the school rooms,—their wan, pinched faces lit up with at least a ray of childish interest.

There is a Swiss custom that a newly married couple shall make a donation to the school in recognition of their education. The mayor of Paris introduced the custom in 1849. The French Chamber of Deputies, 1867, authorized municipalities to create funds by gift and taxation to relieve the necessities of hungry and ill-clad school children. By 1880-1885 laws were general throughout Europe compelling school authorities to provide meals for hungry children. The practice may be said to prevail in the large cities of Europe. Pains are taken to prevent fraud. First of all, the authorities of Paris have found that nourishing soup, meat, potato, and all the bread a child wants can be supplied for three cents. Parents, particularly mothers out at work, find it convenient to have their children get dinner at school. They are supplied with tickets at cost, and, if unable to pay all, they are encouraged to buy at half price. Children without tickets apply to the principal in private, who sells or gives without question. None are refused. If there be suspicion that the parents should pay, an officer, the same who seeks truants, is sent to the home to inquire. The French teachers eat with the children. Neatness prevails. Paper napkins are used.

Berlin maintains school kitchens in poor districts. Brussels and several cities of Switzerland copy the methods of Paris. Italy has adopted a similar system. The children of certain localities in Piedmont, where they suffer from pellagra as the result of eating spoiled polenta of corn meal, are required to eat at school. Trondhjem, Norway, serves free meals to all children. Birmingham, England, before the World War, served free lunches at the low cost of half a cent a meal to the city. Chicago and other cities of the United States, have a system of "penny lunches," a meal ranging from 2 to 8c, at 2c a portion.

Feeling, as an aspect of consciousness, refers to the pleasant or unpleasant phases

of consciousness. The psychologist would not say, "I feel the book." He might say, "I touch the book and my feeling is pleasant because the surface is smooth." Affective elements, that is, pleasantness and unpleasantness, never exist by themselves. The simplest concrete feelings are in combination with sensation, hence they may be called sense-feelings. Press a pencil point lightly against the palm, the stream of consciousness is changed by the experience, but the change is not unpleasant; it may be quite agreeable. Press heavily on the pencil; the sensation becomes unpleasant. In both cases it is a sense-feeling experience; it is sensation plus affection. Theoretically all sensations are affective, but practically the mind has become so accustomed to many of its sensations that they have ceased to be pleasant or unpleasant. Many persons seek new sensations not for the knowledge to be gained, but for the feeling, the affective element involved. The lower animals, no doubt, find nearly all their enjoyment in sense-feeling, hence their enjoyment as well as their suffering must be more limited than that of most men. But many human animals live on the plane of sense-feeling consciousness. Chewing gum is indulged in mainly because of the sense-feeling consciousness it gives. The sensations are tinged with slightly pleasant affective elements. Life on the low plane of sense-feeling means very limited enjoyment because repetition dulls the affective element in the experience. But such feeling is useful; a human animal whose sensations were neither pleasant nor unpleasant would probably make no exertion whatever. If all sensations were tinged with unpleasant affection life would be unendurable; if all were pleasant, self-destruction would be just as inevitable; for then stirring up the bees would give enjoyment, or a child might burn to a cinder before withdrawing his hand from the fire. Sense-feeling is man's guide and mentor, not his proper source of enjoyment.

A more complex phase of consciousness usually referred to as "feeling" is properly called emotion. This experience involves memory and imagination as well as sensation and perception. A man and a young child saw a workman falling from a high building. The child was not much affected because he could not remember, imagine, and think enough to permit what he perceived to disturb him. The man's memories and images at that moment were vivid and so strongly unpleasant that he will never forget them. In the child were no unusual physical changes, in the man the breathing was disturbed, the circulation changed, and muscles were trembling. The man's experience is properly called emotion.

All changes in consciousness are accompanied by physical changes. In the case of feeling, the change occurs most noticeably in the rate of heart-beat and in regularity and depth of respiration. In strong emotional feeling these changes become very marked. Hence emotional excitement is disturbing to vital functions. News, either good or bad, may take away one's appetite for food. Good health cannot be enjoyed by those who are strongly emotional. A happy mood is conducive to physical well-being, but emotion, even when affectively pleasant, disturbs too deeply to be long endured.

Yet if memory and imagination, the representative phases of consciousness, were neither pleasant nor unpleasant, man would almost as well not possess the power to remember, imagine and think. It is the affective element in these experiences that makes him move. The word emotion means moving out from. When consciousness is emotional man moves out from the state in which he was before the period of excitement, and while emotion is not conducive to logical thinking, it is likely to be accompanied by very rapid thinking. Emotion has caused saints as well as sinners to make important changes in their lives.

The highest type of feeling is involved in close, logical thinking. Whenever this kind of thinking reaches a conclusion or judgment, that conclusion is felt to be of value. Man probably would make little effort to think consecutively if his thought were not accompanied by the feeling that it is worth while. This particular feeling is technically known as sentiment. Hence

a conclusion concerning truth is known as an intellectual sentiment, one concerning beauty is esthetical sentiment; if it concerns justice it is moral or ethical in sentiment, and if it concerns goodness or God it may be called religious in sentiment. He who does his own thinking feels the deepest sentiment. Many do not enjoy the greatest pleasure life can give because they do no real thinking. In this highest type of feeling man finds his most refined pleasure. Right education of the feelings, therefore, demands that subordination of sense-feeling which is conducive to physical well-being, that control of emotion which leaves the mind in happy mood, and that intellectual development which will permit one to enter into the full enjoyment of his racial inheritance in science, literature, art, and religion.

Feldspar or **Felspar,** a class of minerals including about fifteen varieties. The common feldspar is a white or flesh-colored crystalline mineral, a little softer than quartz. It is what is known as a rock-forming mineral, or a substance which crystalizes when lava hardens into firm rock, and as such it forms the basis of granite. The color of the granite is due to the feldspar it contains. Several stones used in jewelry are varieties of feldspar, such as the moonstone, lapis lazuli, and the Colorado greenstone. When decomposed the mineral forms clay, some kinds of which are used in making fine porcelain. Feldspar is duller and softer than quartz, and much softer than granite.

Felix Holt. See CROSS, MRS. MARY ANN EVANS.

Fellowship, an honor granted by a college to a graduate student of unusual promise. Fellowships are given so that such students may pursue further a particular line of study, and sometimes require a certain service to be rendered to the college in return for an annual grant of money. English universities offer fellowships with larger grants and for longer terms than American universities. A fellow, as the holder of one is called, may receive from $750 to $1,500 a year for six years in Cambridge, Oxford or other English university, but in America, where the custom is rather new, seldom more than $500 for one year. In some cases the fellow may renew it for one or two years. Some students are given traveling-fellowships, which permit them to use the gift in studying at other universities.

Felony, the second in point of seriousness in the common-law list of crimes, the first being treason. Theft, robbery, burglary, homicide, etc., are classed as felonies, and are punishable by imprisonment or by death. Felonies are defined by the statutes of the states of the United States, but are not defined by the Federal law. After a felony, the most serious crime is a misdemeanor. However, the meaning of the term varies in the several states.

Felt, a fabric formed of wool, hair, or fur, by matting the fibers together under the influence of heat, moisture, and pressure. The invention of felt is ascribed by tradition to St. Clement. It is said that he put carded wool in his sandals to keep his feet warm. He found that the warmth, moisture, and pressure of his feet felted the wool into something resembling cloth. In Roman Catholic countries the hatters celebrate St. Clement's day on the 23d of November in honor of his discovery. As a matter of fact felt was known long before St. Clement's time. It is thought that the first cloth ever made was a species of felt. It was probably produced by treading under the bare feet the wool of sheep and the hair of goats.

Since the invention of the microscope made possible the examination of the structure of wool fiber a much more perfect felt has been produced. Previous to this invention the real cause of felting was unknown. Consequently the method employed in the manufacture was far from scientific. The microscope revealed the fact that nearly all animal fibers are covered with minute scales or hooks pointing in one direction and overlapping each other, as do the scales of a fish. These scales have been counted successfully. No animal fiber has less than 1,000 to the inch, and some reveal as many as 2,400 to the inch. When hair or wool is worked, rolled, and pressed, these tiny scales or teeth catch into and hold each other fast. If sub-

jected to alternate baths of hot and cold water the fibers shrink within themselves, which adds to the action of the scales in making a firm mat. Wool fiber is naturally wavy or crinkled, and this form is an advantage in helping the fibers to become closely interlaced with each other. Cotton and other vegetable fibers are smooth and straight. They cannot be felted, although occasionally small quantities are used in admixture with animal fibers.

The manufacture of felt is the simplest process used in producing fabrics of any sort. As short fibers and many "waste" products may be used, common felt is usually quite inexpensive. For special purposes, however, high grade raw materials are employed. In the making of felt for hats the best of fur is chosen.

In making felt the fiber is carded into fine, gossamer-like sheets, the size of the finished web. These are laid one on top of another. The finest fiber is reserved for the top layer. If several grades are used the secret of success lies largely in distributing the better grades properly through the mass. This is the only part of the operation which requires skill and judgment. The other processes are entirely mechanical. The pile of fluffy sheets of wool is pressed between heavy rollers. Sometimes the rollers are heated with steam. Sometimes the felt is immersed in hot water. An oscillating motion is given to the rollers, which aids in the contracting and matting of the fiber. After a few hours in the machine, a sheet of strong, compact felt is the result. In making light weight felt several layers are pressed at one time, an "apron" being laid between each two layers. After leaving the press the fabric is fulled, dyed, and pressed. Fine qualities are napped, brushed, and sheared, as are woven goods, to produce a smooth surface.

Felt of various grades is in use for a vast number of purposes. It is employed in the manufacture of boots and shoes, in the rubber and saddlery trade; for packing engines, deadening sounds, in making refrigerators, for carpets, rugs, and table covers, for linings. trimmings, mittens, and gloves. Men's, women's, and children's hats of every variety and quality of felt are produced in large numbers. Felt is of greater importance, probably, in this line than in any other industry.

Felton, Cornelius Conway (1807-1862), an American scholar. A native of West Newbury, Massachusetts. He was graduated at Harvard in 1827 and taught at Northampton, Massachusetts, and Genesee, New York. In 1829 he was a Latin tutor at Harvard and a year later a tutor in Greek. In 1832 he became Eliot professor of Greek, and in 1860 he was made president of Harvard. President Felton did much to popularize Latin and Greek. Several translations and school editions of Greek authors are to his credit. His best piece of work was a spirited volume, *Ancient Literature and Art,* which led many a young man to choose a classical course in college. President Felton was a member of the Massachusetts Board of Education, a regent of the Smithsonian Institution, and a member of various learned societies.

Fencing, the art of attack and defense with the sword or foil. Fencing probably originated in the sixteenth century when it occupied much of the time of the French nobles. Until the beginning of the nineteenth century, when dueling began to be frowned upon, no gentleman was without some degree of skill in the art. Today it is becoming more and more popular as a sport. It is played only with light foils, or small, flexible swords tipped with rubber buttons. Under the direction of the Amateur Athletic Union the Amateur Fencers' League of America holds four yearly competitions, open to amateur fencers of any country. Many colleges and universities have classes in fencing; some of them have college fencing teams, which compete for one of the league medals. The sport is good training in altertness, cool-headedness, and muscular control, and it cultivates grace of carriage. See ATHLETICS.

Fenelon, Francois, fron′swä′ fā-neh-lōn′ (1651-1715), a noted French prelate. He was educated at Paris. He received holy orders in 1675. Three years later he

was placed at the head of an institution designed for the reception and conversion to Catholicism of the young daughters of such Huguenots as had not fled the country. He was a man of the highest character. Later Louis XIV placed him in charge of the education of his grandsons, and was so well pleased with him that he made him archbishop of Cambrai.

Fenelon got into an oratorical and pamphlet controversy with his superior, the celebrated Bossuet. One of his books, entitled the *Maxims of the Saints,* was submitted to Pope Innocent XII. The holy college condemned the work, marking with especial disapproval no less than twenty-three passages contained in it. Fenelon submitted with good grace. He spoke from his own pulpit of the condemnation of the book, withdrew it from circulation, and presented to his cathedral a magnificent piece of gold plate on which the angel of truth is represented trampling erroneous works under foot. Such was the general belief in Fenelon's sweetness of character and freedom from hypocrisy that he was given credit for the utmost sincerity. This, too, in an age when worldliness was imputed very generally to the dignitaries of the church.

Fenelon also wrote a work called *Telemachus,* a sort of historical novel suggested by the wanderings of Ulysses. It was intended for the instruction of the young princes in the art of governing aright. Its publication also gave offense. People prominent at court persuaded Louis XIV that it contained covert attacks upon French statesmen and the great monarch himself. Louis banished Fenelon to his own archbishopric, forbidding him even to correspond with the young Duke of Burgundy and the other royal princes. Though now almost forgotten, the details of Fenelon's life are full of interest. In the midst of corruption and worldly policy he is really a remarkable man whom it were well that the world knew better. His published works, now little read, extend to twenty volumes, embracing theology, literature, history, oratory, and art.

Fenians, an organization formed in America and Great Britain in 1859 to secure the independence of Ireland. The Fenian society was organized on the model of the United States Constitution with local, district, and state circles, and a congress. Fenian congresses met in Chicago and Cincinnati in 1865. As many as 60,000 Irishmen are said to have been enrolled. In 1866 several Fenian attempts were made to invade Canada. Two companies actually crossed the Canadian frontier, but were driven back. The leaders were arrested by the United States authorities and sent home on parole. Several Fenian outbreaks occurred in Great Britain, and Fenian rioters were arrested. The repeal of obnoxious legislation and a more liberal treatment of Ireland have allayed Irish discontent. Dissensions within the organization have broken it up. As to the origin of the name, Fingal and his Fenians are the legendary heroes of Ireland, corresponding to King Arthur and his Knights of the Round Table. Their deeds are the theme of many a legendary tale and song. MacPherson's *Ossian* was the legendary son of this famous chieftain, Finn or Fingal, for whom, we may add, Fingal's Cave is named.

Fennel, a plant of the parsley family. It resembles dill in appearance. There are several species. The yellow flowers of the common fennel are sweet scented. The seeds are cylindrical and yield an aromatic oil, much used in medicine. In Europe the leaves are used for seasoning.

Fenris. See LOKI.

Ferdinand V (1453-1516), king of Aragon. In 1469 he married Isabella of Castile. The two principal Spanish kingdoms of Castile and Aragon were thus united, laying the foundation of modern Spain. During the reign of these monarchs the Moors were expelled from Granada. Ferdinand was surnamed "the Catholic." In contrast with the gentle Isabella, he was a cruel, deceitful, despotic man. The events for which his reign is noted are the establishment of the Spanish inquisition in 1480; the discovery of America in 1492; the expulsion of the Jews from Spain and the conquest of Granada in the same year; and the expulsion of the Mohammedan Moors in 1501. See MOORS; COLUMBUS.

Fergusson, Robert (1750-1774), a Scottish poet. He lived in Edinburgh. He was a scholar of St. Andrew's University, and later held a clerkship in his native town. He led a brief, convivial life, but died in deep melancholy. He was a favorite of society. He wrote Lowland Scotch verse with facility, and is considered a forerunner of Burns. Burns fully acknowledged his indebtedness and raised a memorial stone in the old Canongate above the remains of "his elder brother in the Muses."

Fermentation, a composition or change brought about in vegetable or animal matter by the action of minute plants, or by certain active substances. The change of apple juice to hard cider, of grape juice to wine, sweet water to vinegar, malt to beer, starch to sugar, or sugar to alcohol is a process of fermentation. The souring of milk, the rancidity of butter, the formation of curds, the rising of dough, as well as the putrefaction of meat and the decay of vegetables are due to fermentation. Some of the fermenting agencies or ferments, as the yeasts, are microscopic fungi; others are bacteria; and others again, forming a class by themselves, as the diastase of the brewer and the pepsin of the gastric juice, are lifeless, though active chemical agencies. Within bounds, fermentation is not only useful but absolutely necessary in the world's economy. Without fermentation, animal and vegetable substances would not return to earth again. Fermentation may be prevented in several ways. In the first place, the germs of ferment may be excluded by canning, bottling, pickling, and other processes. It may be prevented by heat. A liquid maintained at the boiling point would not ferment in a thousand years. It may be prevented by cold. Frozen meats do not putrefy. The frozen carcass of a mammoth was found in Siberia, where it had lain for no one knows how long, probably thousands of years. Absence of moisture prevents fermentation. Dried beef keeps for a long time. The carcasses of animals that die in the Sahara dry up, and, unless torn to pieces by birds of prey, are preserved for an indefinite length of time. Alcohol, salt, an excessive quantity of sugar, and other agencies poison the germs of ferment and prevent decay. See BACTERIUM; BEER; VINEGAR; YEAST, etc.

Ferns, a large group or order of flowerless plants. They vary in size from tiny, hair-like creepers to tree ferns forty feet high and a foot in diameter. There are 165 kinds of wild ferns in the United States, with not over twenty in any one locality. There are about 5,940 species of ferns in the world. Jamaica has 550 different ferns, Java has 600. The waving leaf-like plumes of the fern are known to botanists as fronds. Ferns have no flowers, but the observer will notice black or brown fruit dots on the under surface or margin of the fronds. These on ripening produce a shower of dust-like spores from which new plants arise by a peculiar process. The spore grows into a heart-shaped bit that produces a seed-like cell from which a new fern springs up. New ferns are produced also by root-stocks whose tips get ready in the summer for spring growth. One of our ferns, called the walking leaf, has long, drooping fronds or leaves, the tips of which reach the ground and take root, making new plants. Other American ferns are, first of all, the maidenhair, with black polished stipes and foliage that never gets wet; the hart's-tongue, with fruit dots in two lines, like the feet of a centipede; the shield fern and the bladder fern, named from the shape of their fruit dots; the climbing fern, that climbs over bushes; and the cinnamon fern, clothed with cinnamon-colored wool in early spring. Ferns may be made to adorn old foundations and unsightly corners; the wild varieties are the best. Transplant them in the fall or early spring, set in a shady place out of the wind, and cover the roots with a few inches of rotten leaf mold from the forest. A superstition was current in England at one time that fern seed gathered on St. John's Eve renders the bearer invisible.

Ferret, a relative of the weasel, now known only as a domesticated animal. It is about fourteen inches long. It is of a whitish or yellowish color, with red or pink weasel-like eyes. It is bred in con-

finement, both in this country and in Europe. It has an exceedingly slender, lithe body, and is used to rid houses of mice and rats. English poachers and gamekeepers use the ferret to drive rabbits out of their underground warrens, a bag being held over the entrance to catch the rabbits as they come popping out. As a verb, the term, ferret, is used to denote a sly, furtive method of detecting crime or drawing out a secret.

Ferrex and Porrex. See TRAGEDY.

Ferris Wheel, a device for pleasure seekers. It may be described as a merry-go-round on edge. The cars are swung between the circumferences of two large wheels. The axis of the wheels or wheel is turned by power. As the wheel turns, the cars are carried up and down, describing the circumference of a circle. The cars are swung in such a way that they retain an upright position. Ferris wheels are a popular feature of fair grounds and summer resorts. The original Ferris wheel was built on the grounds of the Columbian Exposition at Chicago in 1893. The inventor was Mr. G. W. G. Ferris, of Pittsburg. The wheel, the largest wheel ever built, was 250 feet in diameter, and swung fourteen feet in the clear. The upper part of the circumference was thus 264 feet above the ground. This wheel carried 36 cars. Each car had seats for 40 passengers. This wheel weighed 2,200,000 pounds, 1,100 tons, and cost $300,000. After the close of the Chicago fair the wheel was operated for a time on North Clark street, and later it was set up in St. Louis. Finally, being too large to pay for removal from place to place, it was sold for old iron; but it has been succeeded by many imitations.

Ferry, a boat used to carry passengers and vehicles across a stream or other narrow body of water. The keeper of a public ferry is required to hold himself in readiness at all hours and, within reason, in all sorts of weather. If he has acquired the privilege of landing on each shore he is protected in his rights by common law. A rival may not establish a ferry in his immediate neighborhood without being subject to suit for damages resulting from loss of custom. Charges differ greatly in different parts of the world. In the western part of the United States ferries are maintained very generally at public expense, and are free. Ferry charges in Europe are very low indeed. A loaded team is taken across a considerable river for three or four cents. A tourist with a wheel pays the ferryman perhaps a cent and a quarter for being rowed across a small stream.

Ferry boats differ greatly. Common rowboats may be used for foot passengers. Broad flat-bottomed scows, with end aprons that may be lowered at the landing places, are employed usually to convey teams and vehicles. A ferry boat of this sort may be fastened by ropes and pulleys to a cable running from shore to shore. By lengthening the trolley rope at the near end of the ferry, and allowing that end to drift down stream a few feet, the current of the river serves to drive the boat across to the farther shore. Progress may be hastened by laying hold of the cable and pulling. On the Rhine and elsewhere flying ferries are maintained. The ferry boat is held in position by a cable anchored in midstream far up the river. The ferryman controls his boat by means of a large rudder, thus utilizing the current to send it from this shore to that, or back again.

The largest ferry in the world is said to be a steam ferry plying on Lake Baikal in the route of the Russian Trans-Siberian railway. It weighs 21,000 tons. It has four lines of railway track. It can carry forty-eight railway coaches The trains occupy the main floor. Accommodations are provided for the passengers on an upper deck, where there are two large public saloons, two large drawing rooms, and twelve private staterooms. Meals are served in transit.

Large steam ferry boats ply between the city of New York and adjacent shores of Long Island and New Jersey. Passengers approaching San Francisco over the Southern Pacific leave the train and are ferried across the bay by means of large boats. The oldest ferry in the United States is said to be that plying between Chelsea and Boston. It was established in 1631.

A peculiar ferry has been set up across the Seine at Rouen, France. A tower of well braced iron work rises on either shore. Over these towers heavy cables pass after the manner of a suspension bridge. A level trolley track supported by the cables reaches from tower to tower. This track is 140 feet above the surface of the Seine. The ferry, or carrier, is suspended underneath by cables from pulleys that run on the track overhead. This carrier is large enough to take on street cars and vehicles of all descriptions. It makes regular trips from shore to shore.

A similar ferry has been established at Duluth, Minnesota, where the ship canal crosses Minnesota Point. Street cars, drays, vehicles of all sorts, and foot passengers are carried to and fro across the canal in a swinging basket. The basket is suspended by cables reaching to a trolley-way in midair, so high above the canal that ships are able to pass under it without obstruction. The principle is not altogether different from that of a hanging cash basket in a large department store, except that the carriage is large enough to carry a street car and its passengers. Guys are employed to make certain that the flying platform makes proper connections with the track on either shore.

A new type of ferry is reported at Glasgow. Owing to the rise and fall of the tide it is necessary to drive down the dock of the ordinary ferry at some hours and to drive up at other hours. A powerful steam ferry costing $125,000 has been built to meet this difficulty. The deck of the new ferry may be raised and lowered by steam power, so that it is possible to keep it on a level with the wharf landings. The floor is large enough to carry twenty loaded drays.

See LIVERPOOL; NEW YORK; DETROIT.

Ferry, fa-rēe′, **Jules** (1832-1893), a French statesman. While practicing law in Paris he dipped into journalism, always as an opponent of the empire of Napoleon III. As a member of the National Assembly he voted against the war with Prussia. He was mayor of Paris during its siege by the Germans in the winter of 1871. After the close of the Franco-Prussian War he held various important positions under the republic. As minister of public instruction he brought about the expulsion of the Jesuits. As prime minister he put forth efforts, not always successful, to secure territory in Africa and Farther Asia. His reputation is that of an intelligent patriot who served his country faithfully and well.

Fertilization, in botany, the action of pollen on the young seed in the ovary of the pistil. See article on FLOWER. When corn is in the silk the tassel is shedding a shower of yellow dust called pollen. Each grain of corn on the young cob has its thread of silk, the end of which just shows from the end of the husk. Grains of pollen must fall on the gummy ends of the silk, a grain of pollen for each thread, and send long, fine rootlets down the centers of the silk which are really hollow tubes, into the young seeds which then develop into grains of corn. Shelter the silk when the pollen is falling and the corn on that ear will not fill. In some plants the stamens touch the pistils; in some the pollen falls on the end of the pistil. Some plants are wind fertilized, and to some plants, as in most honey-bearing plants, the visitation of insects is necessary to bring pollen either from another or the same flower into touch with the open end of the pistil tube. See article on FIGS for a curious case of carrying pollen from one tree to the fruit of another. Whatever the way in which it may be done, no seed will fill unless a pollen root has grown down the pistil into it. See CROSS-FERTILIZATION.

Fertilizer, in agriculture, any substance added to the soil to stimulate plant growth. Plants need certain elements for growth. Any substance that furnishes one or more of these elements, or that makes available an element already in the soil, may be regarded as a fertilizer. In a broad sense water is a fertilizer. Water is needed for plant growth, and water acts on soil to free elements needed by vegetation; but the term fertilizer is held usually to include only barnyard manures, green manures, and commercial fertilizers.

BARNYARD MANURES are the best for general purposes. A ton of barnyard

manure may not contain more than thirty or forty pounds of the food required by plants; but, in rotting in the ground, the coarse stuff may act on the particles of soil and set several hundred pounds of plant food free, and not only that, the rough part of the manure aids the soil in holding moisture. The principal elements of plant food contained in barnyard manure are nitrogen, phosphoric acid, and potash. One ton of average stable manure contains about 10 pounds of nitrogen, 10 pounds of potash, and 5 pounds of phosphoric acid.

Animals fed on nitrogenous foods, as clover, alfalfa, bran, oilmeal, oats, and cottonseed meal, supply manure rich in nitrogen. Animals fed chiefly on wild hay, straw, corn fodder, and timothy do not yield manure of as valuable a quality. Young growing animals, as colts and calves, and lean animals,—animals needing the nutritious elements of food for their own growth,—do not supply as valuable barnyard manure as older animals and fat animals. Manure from fattening steers and fat hogs is particularly rich in plant food. Building up bone and meat requires the elements that otherwise go to make rich manure. Putting on more fat requires the elements that plants derive from the air, and leaves for the manure pile the elements that the plants derive from the soil,—nitrogen, phosphoric acid, and potash, which, if returned to the soil, restore its fertility. The guano from the poultry yard is a highly concentrated fertilizer.

The Care of Manure is of first importance. Dry manures, such as are obtained from horses, sheep, and poultry, are likely to heat,—a process that liberates nitrogen, one of the very elements most desired for the field. A "smoking" manure pile loses strength rapidly, and becomes about as valuable as so much straw. Dry manure may be prevented from "burning" by keeping the pile moderately wet or by mixing it with the cold and wet manure from the cow barn and pig pen. A manure pile should on no account be allowed to leach. The colored liquid that runs away from the pile during a rain is precisely what the soil requires. Its escape is quite as wasteful as rat holes in a granary. If a pile is to be formed, it should be made in a hollow spot. A concreted bottom saves its cost many times over. A broad, flat pile, tramped thoroughly by stock, saves the strength of the manure best. Droppings around the yard should be thrown into the pile, winter and summer. Stable liquids are exceedingly valuable; they should be absorbed by bedding and be added to the pile. Straw bedding is best for the land. Sawdust is most desirable in the stable, but it decays so slowly that it is a detriment to the field.

The Use of Manure. Good farmers declare that manure should be scattered on the land fresh. Piles of manure dumped in the field leach badly. The immediate spot receives more plant food than it can utilize and the coarse litter spread by a fork later has lost much of its strength. In case of sheep pens, calf pens, and small feeding pens generally, excellent results are obtained by allowing the manure to remain under foot till spring. The droppings, bedding, and liquids are saved perfectly and are tramped into a compact bed of valuable fertilizing material. For manure that must be removed daily, as is decidedly the case in dairy barns and horse stables, it is considered advisable to send to the field as often as a load accumulates. A basket manure carrier running on a wire and dumping into a manure spreader is the modern method of disposing of manure. As often as the spreader is filled, it is driven afield, and the manure is scattered in fine bits. The leaching that follows, always provided the ground be moderately level, enriches the soil uniformly. The latter may be plowed under at convenience. Frequent light dressing gives larger yields than a heavy application of manure at long intervals.

Green Manure. One of the least laborious methods of fertilizing land is that of plowing under green manure, that is to say, turning under a growing crop. Rye, grasses, and particularly clover and other legumes, make the best crops for this purpose. A growth of weeds turned under before the seeds mature is beneficial to the soil. Early plowing of stubble be-

fore the undergrowth is taken by frost is an excellent practice. The green growth not only adds fertility to the soil directly, but the acids of decay etch the soil particles and form compounds that feed the next crop. The humus formed by the green manure benefis both clay and sand. Contradictory as the statement may seem, green manure makes clay soil warm and mellow, while it makes sandy soil cooler and more compact.

COMMERCIAL FERTILIZERS may be defined as highly concentrated manufactured plant foods. They differ widely in composition. If the need of a particular soil be known, a fertilizer may be chosen to supply the element or elements especially needed. The disadvantage of these fertilizers is that they do not supply humus; but there are other advantages. They are free from weed-seeds. They may be applied in small quantities in the hill or row, and they are available immediately for plant growth. Gardeners and others tilling intensively favor these fertilizers, not only for the reasons named, but also because they are not bulky and afford no litter to interfere with tillage.

As stated, the chief elements of fertilizers are three,—nitrogen, phosphoric acid, and potash. The following is a description of the best known fertilizers:

NITROGEN FERTILIZERS.

1. *Guano.* The droppings of fish-eating sea birds in a rainless climate. Certain islands off the Peruvian coast have for many years furnished guano, but the deposits accumulating for centuries have now been well nigh exhausted. Sometimes the droppings from the poultry yard are called guano.
2. *Cotton-seed meal.* This is a pomace left after the oil has been pressed out of cottonseed.
3. *Dried blood from the slaughtering houses.* This is a quick-acting fertilizer and contains about twelve per cent of nitrogen.
4. *Refuse or tankage from the slaughtering yards.* It consists of all manner of odds and ends—intestines, bones and waste—dried and ground into meal.
5. *Dried fish or fish guano,* made from a kind of fish called menhaden, bought for the purpose in quantities along the Atlantic coast. It may be recalled in this connection that the Indian taught the Plymouth settler to put a fish in each hill of corn.
6. *Chile "saltpeter,"* a nitrate of soda obtained from the rainless region of Chile. It contains as high as sixteen per cent of nitrogen. It is used in the United States.
7. *Chemical nitrogen fertilizers,* a convenient term under which to group a variety of fertilizers obtained in the manufactures.

PHOSPHORIC ACID FERTILIZERS.

1. *Ground bone or bone meal* is rich not only in nitrogen, but it contains as high as twenty-two per cent of phosphoric acid. There are a number of varieties.
2. *Rock phosphate,* a fossil guano it is thought, found in layers in Tennessee, South Carolina, and Florida. The rock is ground fine and is shipped in shape for application. It is used largely in the Aroostook potato region of Maine. It yields immediate results. The percentage of phosphoric acid runs from twenty-six to forty per cent, the Florida phosphate being richest. In 1907 the United States produced 2,265,000 tons of phosphate rock. In 1908 large tracts of phosphate lands in Utah, Idaho, and Wyoming were withdrawn from public entry.
3. *Phosphoric slag,* a by-product obtained in the manufacture of steel. It is reduced to a fine powder and contains from fifteen to twenty per cent of phosphoric acid.
4. *Chemical phosphates or super-phosphates.* A number of these fertilizers are made by treating ground bone and phosphate rock with sulphuric acid. They are used extensively because plants may begin to feed on them without waiting for chemical action in the soil. They produce instant results. A starving plant shows the effect of such a fertilizer almost as quickly as a wilting plant shows the effect of moisture.

POTASH FERTILIZERS.

1. *The unleached ashes,* especially of hardwoods, supply potash. Beech ashes contain sixteen per cent; elm twenty-four per cent; oak ten per cent. Ashes exposed to rain until the lye has leached away have little value as fertilizers.
2. *Tobacco stems.* These contain about eight per cent of potash.
3. *Chemical potash.* Several localities in Germany are noted for commercial potash. Some of these potashes are found in deposits of chemical salts; others are the products of chemical factories. They are used extensively on soils lacking in potash. The German potash trust sells about $24,000,000 worth of potash yearly. About half of it is purchased by the German gardeners.

In addition to the fertilizers named, lime is used widely as a corrective for "sour" soil. It makes clay more

mellow. Burnt limestone, ground limestone, gypsum, or land plaster, crushed shells, and marl are applied for the purpose. As stated, commercial fertilizers do not supply humus. The best results are obtained by their use in combination with barnyard manure. They are applied usually by means of drills attached to the machine or implements used in planting seed. The mistake must not be made of supposing for a moment that fertilizers take the place of tilth and moisture; all are necessary.

The following paragraph written by Professor Voorhees gives an excellent idea of the cash value of manure to the farmer:

A farmer should realize that a well fed dairy cow will, on the average, produce 12¾ tons of manure per year, and that this product will contain on the average 117 pounds of nitrogen, 77 pounds of phosphoric acid, 89 pounds of potash, enough, if all the constituents in it are used, to grow nearly 70 bushels of wheat with the accompanying straw. These have come from the farm somewhere; if they are not returned the power of the soil is lessened.

If the farmer wished to return these in the form of commercial fertilizers, he would have to pay out $30 at present prices—20 cents per pound for the nitrogen and four and a half cents each for the phosphoric acid and potash.

The following table shows the amount of fertility marketed with each one thousand dollars' worth of certain farm products, the fertilizers being reckoned at going prices. As prices vary with locality and year, the figures are merely approximate.

Commodity.			Value.
Wheat	$1,000	Fertilizer	$250.00
Milk	1,000	Fertilizer	110.00
Beef	1,000	Fertilizer	85.00
Pork	1,000	Fertilizer	60.00
Butter	1,000	Fertilizer	1.25

No grass, no cattle;
No cattle, no manure;
No manure, no crop.
—Flemish Proverb.

There is no waste on the farm which is so wanton, so inexcusable, as the too common waste of stable and barnyard manure.—A. M. Teneyck.

The real cash value of manure is not given proper consideration by most farmers. At ordinary commercial prices the nitrogen contained in the air above each acre is worth more than ten million dollars. By means of bacteria which live on their roots, clover, and other legumes have power to draw on this unlimited supply of free nitrogen.—C. H. Hopkins.

In recent years the fixation of atmospheric nitrogen has received great attention, both for its use in explosives during the World War and in fertilizers for food production. It was regarded as of so much importance that the assertion has been made that Germany waited until the problem of fixation of atmospheric nitrogen had been solved before beginning the war in 1914. In 1918 a single plant in Germany took about 100,000 tons of nitrogen from the air. This was equivalent to one-fifth of the South American output furnished to the rest of the world; and it was several times more than the capacity of any American plant at that time.

Chemical fixation of the nitrogen contained in the air is now accomplished by means of the electric arc, electric furnace, and the liquefaction of air. In the modern process the action of nature during a thunderstorm is imitated, and by the influence of discharges from a powerful electric arc the nitrogen and oxygen of the air are caused to combine to form nitrogen peroxide. This, when treated with water, forms nitric and nitrous acids, which are then changed by further treatment to calcium salts or lime nitre.

Nearly four-fifths of the air being nitrogen, when air is liquefied by cold and pressure and part of it allowed to boil away, ammonia may be obtained from the purified nitrogen; and this in combination with any desired acid forms a valuable fertilizer which is manufactured on an industrial scale, as nitric acid. Another fertilizer, calcium cyanamide, is formed by passing nitrogen obtained from the air over calcium carbide in an electric furnace at a high temperature.

Before the war the United States imported large quantities of potassium and nitrogen compounds for use as fertilizers. The supply of potassium from deposits in Germany were the chief source of the world's supply, and the United States imported about a million tons yearly. Germany was confident in its supposed monopoly, but the United States solved the problem by establishing a potash industry which has grown to large proportions.

By 1920 its production of potassium oxide had grown to a capacity of nearly 100,000 tons, or an increase of a hundredfold in five years. More than half of the wartime potash came from natural brines, obtained from lakes in California and western Nebraska. One lake in California is believed to contain from ten to twenty million tons of potassium oxide. Other sources of supply were found in ocean kelp, dust from cement kilns and blast furnaces, wood ashes and vegetable waste, wool scourings, and certain minerals that are rich in potash. By a newly discovered method of dust removal by electricity adopted in the cement industry, the Bureau of Soils estimates that 100,000 tons of potassium oxide can be obtained annually, and the possible production of potash by applying this method to blast furnaces manufacturing pig iron has been estimated at 300,000 tons of potassium oxide a year.

Potassium oxide is rich in the ashes which form potash, used as fertilizer. Among vegetable wastes, dried banana stalks contain ten percent of potash, and it is also obtainable in small amounts from tobacco stems, beet sugar wastes, sugar refinery wastes, etc. Minerals rich in potash include alunite, a compound of aluminum and potassium, and a number of the silicates found in Georgia, New Jersey and Wyoming. With the beginning of an American potash industry it is no longer true, as it was as late as 1915, that "Germany controls the market of the world for the metal potassium and its compounds." But it remains to be seen whether the new American industry will be able to compete successfully with German competition under the changed conditions since the war. Nature has furnished the United States with abundant supplies of phosphate rock; nitrogen obtained from the air by the chemical process of fixation promises a sufficient supply of several compounds of that element; and it only remains to produce potash in sufficient quanties from potassium oxide to make the United States independent of other countries for its supply of the three great fertilizing elements, phosphorus, nitrogen and potassium, which are essential in their compounds for the enrichment of the soil and the success of agriculture in its various forms. We have long depended upon the natural fertility of American soil, but a constant succession of rich harvests cannot be expected unless the soil is conserved by proper crop rotation or by the use of fertilizers containing the three elements it needs.

Fessenden, William Pitt (1806-1869), an American statesman. He was born in Boscawen, New Hampshire, studied at Bowdoin College, and in 1827 was admitted to the bar. Five years later he was sent by the Whig party to the legislature of Maine, in which state he had been practicing law. There he served eight years, and in 1841 was elected to Congress. In 1845 he returned to the legislature for another period of eight years, after which he was sent in 1854 to the United States Senate. During the last two years of Lincoln's administration he was secretary of the treasury, afterward serving in the Senate till his death. He won a wide reputation as a debater and a constitutional lawyer.

Festivals, days set apart at stated intervals for public rest or rejoicing or for solely religious purposes. Originally all festivals were of a religious character, the Pagans believing that the food, dancing and other pleasures of the day must be shared with their divinities. The Romans often celebrated such days with gladiatorial shows, the Greeks with games. The chief Jewish festival was that of the Passover, to celebrate the escape of the Hebrew people from Egypt. Our Sunday, the survival of the Jewish Sabbath, is the only festival recognized today by all of the reformed churches. The Roman Catholic church in the United States retains six others which it requires to be observed, in addition to a number less strictly kept.

Fetish or **Fetich,** fē′tĭsh, a word from the Portuguese first applied to special objects of worship among the negroes of the Senegal. It is now used for any object which a heathen regards as the dwelling-place of a spirit; it may be a tree, a mountain, a river, a feather, a bit of metal, a fish,—in short, anything which his imagi-

nation can lead him to think the home of his god. Sometimes a fetish is worn about the neck, or carried elsewhere on the owner's person. If the savage thinks his god has forsaken him or played him false, he sometimes destroys the fetish. The difference between fetish-worship and idolatry lies in the fact that an idol is not necessarily regarded as the dwelling-place of the god it represents.

Feudalism, a medieval political and social system. It reached a high degree of development in western and central Europe. The collapse of Charlemagne's Empire left his extensive domains in disorder. Bandits prowled unchecked. Light armed bands of Hungarians rode furiously through the land like Cossacks. Year after year plundering Danes in long, light, many-oared ships followed the coasts, threaded the inlets of the sea, and ascended the rivers, ravaging, plundering, and burning. In such a condition of affairs, proper incentive was impossible; thrift but invited assault; savings invited torture; hearthstones invited desecration. No one could build with the certainty of occupying; none could sow with the reasonable assurance of reaping. Had not the strong arm of the Teuton and his genius for political organization come to the rescue, the fairest portions of Europe must have relapsed into savagery.

Feudalism took the place of Charlemagne's imperial courts and soldiery; it arose to protect life and property. Whatever abuses and after developments of feudalism may have arisen, it should be borne in mind that the institution arose out of the natural instinct of the strong to provide that protection for themselves and theirs which a shadowy or altogether lacking general government did not provide. Strong men everywhere, old captains, counts of the empire, sturdy landholders, militant abbots, martial men of high degree, and fighting men of low degree began the fortification of their homes, and the weak flocked to them for protection. These early strongholds grew into castles.

The fundamental theory of feudalism is not aristocracy, but protection. The persons of feudal society are the protectors and the protected. A protector may in turn be protected by a higher protector, and so on up to the monarch. The early feudal leaders neither usurped nor inherited their estates. They were natural leaders, men of prowess, who sprang into positions of danger, men who built fortresses and organized followers, joined forces and finally put an end to invasion. In later days feudal possessions were inherited. Occasionally occupiers of strongholds themselves became robbers. Advantage was seized to oppress the weak; and in time feudalism, having outlasted the necessity of its being, became the recognized means of oppressing the common people, and thus it had to go.

As a military organization the striking features,—the essential features,—were the castle and the mailed horsemen. Castles,—massive structures of masonry, of which an account may be found elsewhere,—rose, converting hills, promontories, mountain passes, and islands into impregnable strongholds. The strength of a great castle was such that, once within its shelter and provided with food and water, the owner and his garrison might defy the power of a monarch.

The mailed horsemen, the knights and their followers, are described in the article on CHIVALRY. The armor-clad warriors of Europe during the eleventh and twelfth centuries must have numbered some hundreds of thousands. The rolls of William the Norman called for a war strength of 60,000 English knights in armor ready to ride at his call. The thousands of dismantled castles, that still crown hill after hill and overhang every road and river, indicate that continental Europe also was policed effectively. The Danes and the Hungarians and the bandits were able to give the slip to slow-moving bodies of footmen; but the iron-clad horse of the castle,—for "in these days, kings, nobles, and knights, to be always ready, kept their horses in the rooms in which they slept with their wives,"—ready to pour out like bees on provocation, rendered the passes impracticable and the fords impassable. The petty raids of the invaders ceased and

feudalism entered upon centuries of rise and decay.

The system of landholding in vogue is known as feudal tenure. Some eighty variations are described, but certain general ideas underlie all. To begin with, every landholder was in theory a tenant of some superior holder or landlord. This superior landlord was known as a lord or suzerain; the landholder was a vassal; the land so held was a fief. A lord might have many vassals and might himself be a vassal. In theory, at least, the greatest lord was the monarch. A vassal might hold many fiefs and be a vassal of many lords. A vassal might also sublet holdings and be a lord to many vassals. In this way lands were divided and subdivided, the lowest possible limit being a bit of land on which a vassal could maintain himself without manual labor and be in position to report in person or send a mounted horseman if called upon for military service. Such a tract was known as a knight's fee. Fiefs were rated at so many knights' fees or knights' holdings.

Lords and vassals constituted a military aristocracy. The importance of a lord depended upon the magnitude of his fief or fiefs. Complexity of relationship existed between lords and vassals. In extreme cases a king might hold land from a vassal and thus be a vassal of his own vassal. Instead, then, of being a term of reproach, vassal was a term of honor and denoted membership in the aristocratic society of the Middle Ages.

Ordinarily fiefs descended from father to eldest son. When a lord died the eldest son or next of male kin became lord, and vassals were summoned to do homage for their fiefs. This was a public ceremony. The lord remained seated while the vassal approached with uncovered head, sank on bended knee, placed his hands within the hands of his lord and promised to be his man, to be faithful to him, to depend upon him, and to render service as per the terms of his tenure. The lord raised his vassal graciously, gave him the "kiss of peace," handed him a sword or a clod in token of title to the fief, and promised to defend him in the possession of it. In case the vassal failed to appear or refused to do homage, his fief was forfeited, always provided the lord was powerful enough directly or by reason of his connection to enforce the term of tenure. In case a lord of high degree was due to render homage to one of low degree it was customary to appear by deputy. All these were matters of varying and variously enforced etiquette. In case a vassal died his heir was required to do homage or forfeit his ancestor's fief. Thus we hear of newly crowned kings of England summoned to France to do homage for French fiefs held of the kings of France.

The terms on which fiefs were held do not seem severe.

1. *Military service.* Each fief was rated as above stated, at so many knights' fees. The vassal bound himself to appear when summoned with forces of knights and men-at-arms, corresponding to the rate of his fief. This force he was held to maintain in the field at his own expense for a term fixed usually at not to exceed forty days in the year. Each lord had the immediate command of his own vassals.

2. *Court service.* Each vassal was expected to sit as consulting judge in his lord's court, usually three times a year. The lord presided, the vassals (and here again the reader must not forget that vassal is equivalent to gentleman) sat as a deliberative body. A vassal might be condemned only by his fellow vassals, his peers, or his equals, sitting thus in judgment. The council of peers expected to be consulted by the lord ere enterprises of risk and of an unusual character were decided upon. In this we see the germ of the house of lords customary in European countries. The lords have grown out of the court or council of the immediate vassals of the monarch.

3. *Financial service.* A vassal was held by custom to perform financial services of several kinds:

a. A relief or gift amounting to, say a year's revenue, when he received the fief.

b. Aids. The more common aids were aid to ransom his lord if taken prisoner,

aid to meet the expense of knighting his oldest son, and aid in making up a dowry on the marriage of the oldest daughter.

c. Obligation to entertain lord and retinue on the occasion of a visit. Many of these entertainments were conducted on a scale of magnificence. Some of them bankrupted the givers. The comical conditions as to length of time and diet contained in some of the old accounts indicate that some lords were not above the necessity of boarding around.

d. Alienation—fines. In case a vassal desired to transfer his fief to another, he was required to pay a "fine."

e. During the minority of an heir, the lord assumed guardianship and could, if so minded, absorb the revenues on the legal ground that the vassal was too young to render the service by which the fief was held.

f. A lord was entitled to dispose of a female ward in marriage. He might for a sum set her free to marry as she liked. In order to extort payment a mean lord might even resort to threats of a hateful marriage.

Land was not the only property held subject to feudal tenure. We find important offices and the privileges of hunting in the forests, fishing in the streams, and of cutting timber were held by a similar title. Even the church adopted many features of the feudal system. The parishes were held by rectors quite after the manner of fiefs. The clergyman was invested by law with a "benefice" or living, and was entitled by law and custom to parsonage and glebe and tithes and fees. Instead of lord—we speak now of temporal matters—he held under bishop or archbishop, and ecclesiastical courts were held corresponding to the lord's councils of vassals or peers. Bishop and abbot were temporal lords and had vassals and were in turn vassals of temporal lords.

Beneath the feudal aristocracy consisting of vassals and lords, both temporal and spiritual, lay the mass of people. We may understand the condition of the people by the description of what was known in England as a manor. We use the word in the sense of an estate of a lord or thane having a village community settled upon it. A manor may be said to have corresponded in the main to a parish. A single manor or estate might be the whole of a fief, but ordinarily a baron or lord of a manor held many manors. According to the Doomsday survey, William the Conqueror held 1,422 manors in his private royal possession. His brother Odo was given 430 manors scattered through seventeen counties. Other great vassals enjoyed similar holdings. About half of each manor was set apart for the direct use of the lord of the manor. The rest was divided into:

1. Closes or fenced fields, one for each standard crop, as a wheat close, a turnip close, etc.
2. Meadow lands for hay.
3. Commons or pasture lands where stock might be herded.
4. Waste lands where turf and brushwood might be gathered.
5. Forests utilized for timber and swine pastures.
6. Farms to let.

The residents of a manor may be classified as:

1. *Fighting men,* who held farms in return for military service. The lord of the manor depended on these men to render the military service which he owed his lord,—in England, the king. This was tenure of knight service.
2. *Freeholders, soc-men,* or men who held farms at a rental that was neither military nor menial. This rental might be money or fowl or grain or fish, but it was not personal service. The persons of freeholders were their own. They were free to go and to come, but were amenable to the manor courts.
3. *Villeins or villagers.* These were a grade above serfs. They were held for menial service, but they might transfer their allegiance from one lord to another. They held land on specified terms, and, so long as they rendered the agreed service, could not be expelled from their homes.
4. *Serfs or base-villeins.* The distinction between villeins and serfs was not always clear. Those to the manor born might

not leave it, but they knew not what the day might bring forth. Still others held no land. They were household servants—virtually slaves. There was no particular limit to the farm of a freeholder, but the best that a base villein could expect was five acres of land, for which he was obliged to work on the lands of the lord one day a week, summer and winter, and three days a week in harvest. The better class of villeins were allowed five or six times as much land and were furnished tools and utensils, a yoke of oxen, a cow, and six sheep; but they were required to turn out with their oxen to work in the fields of the lord. The abbot of Peterborough held a manor on which eighteen serfs, Hugh Miller, and others, by name, were required to work three days a week for him the year around, save during the holiday weeks at Christmas, Easter, and Whitsuntide, while beyond this, each serf was held to give the lord abbot a bushel of wheat, eighteen sheaves of oats, eight hens, and one cock yearly and five eggs at Easter.

The chief buildings on the manor were the parish church and the manor house. The latter varied greatly with locality and time. Regular features were a great hall, a chamber or two, a kitchen, and cellars. There were, of course, outbuildings, as stables and granaries. The freeholders dwelt in their own cottages on their own farms. The villeins lived in more or less wretched hovels in a village, strung along a central street.

The lord of the manor or his representative was expected to hold court in the manor house. These courts were of two kinds:

1. *Court-baron.* The accounts of tenants were examined; rent and service were inquired into. If the falcon, piece of armor, candles for the parish church, or pound of rare pepper were not forthcoming from the freeholders, or if the beans, peas, honey, and eels had not been rendered by the villeins, or if the miller or the smith had not paid his silver piece, the matter was inquired into.

2. *The court leet.* This was an occasion for a military review and a trial of criminal cases. The knights were expected to appear to show that their arms and armor, their horses and men-at-arms were in readiness for war. If the miller had charged an unjust toll, if the serfs had poached game to appease hunger, if men had brawled over their ale, if women had scolded, if any had committed theft—in all such cases the lord of the manor had authority to assign stripes and imprisonment; but "mercy" prompted him to levy fines instead for the benefit of his own pocket. In case of greater crime, the lord of the manor had no power of life and death. These crimes were tried by a higher court.

It remains to speak of the bailiff or reeve. In the absence of the lord, the reeve was foreman of the estate. He divided the closes into strips and assigned them to the serfs. He decided what land should be plowed and what land should lie fallow to recover fertility. He called out the serfs to fence, plow, sow, reap, flail, ditch, and hew for their master. He collected rents, stored his lord's produce, and marketed the surplus. He was the busy man of affairs of the entire manor. The business-like qualities of the reeve are described by Chaucer in the *Prologue* to the *Canterbury Tales.*

Wel wiste he by the drought, and by the rain,
The yelding of his seed, and of his grain.
His lordes shepe, his nete, and his deirie,
His swine, his hors, his store, and his pultrie,
Were holly in this reves governing.

In theory, the feudal system was admirable. Each person down to the humblest tenant of the soil had a lord whose duty and interest it was to protect him and see that he suffered no injustice. Practically, however, the operation of the system was attended with much cruelty and favoritism. Theoretically, the meanest subject, even a serf, had his day in court, but we know that, practically, in many parts of Europe, and in all parts at times, the luckless wight who acquired the ill will of his lord had little chance for redress. He might be arrested and thrown into a dungeon, where he would be allowed to languish for the rest of his natural life. The king and the courts had authority to come to his relief, but walls were thick and dungeons were deep, and

justice was not always on the alert. One of the greatest obstacles to the growth of the modern nations of western Europe was the power of the large nobles who were practically independent of their sovereigns. Save in England, the king has no immediate connection with the people. The only way that he could enforce the most salutary laws against a noble was by enlisting other nobles to punish him,—no easy matter, in the day of strong castles, a forty day military service, and no gunpowder.

In conclusion, we may say that feudalism united certain Roman and certain Teutonic elements; that it took form in a period of need; that its idea was noble; that it grew oppressive; and that it got in the way of nationality. Gunpowder put an end to the institution of chivalry, and feudalism thus lost one of its chief supports. Cities became a strong political factor. Feudalism, latterly a system of mere privileges, began to lose ground. So great a system cannot die out in a day. The feudal system of land tenure was abolished in England about 1660; in Scotland, in 1747; in France, in 1789, at the time of the Revolution; in Germany and Austria, about 1848; a somewhat similar system was brought to an end in Japan in 1871, when the nobles ceded their rights to the mikado. The great landed estates of England and other parts of Europe were acquired during the days of feudal tenure. There is still much complaint on the score that these estates were acquired on condition that the holders should render military service. The nobility still hold the estates, but the cost of war is defrayed by general taxation. One cannot help hoping that these characteristic estates, with their beautiful parks and buildings, may be kept intact in all their beauty; but there is much reason in the arguments that they should belong to the people and not to a few fortunate descendants of feudal holders.

A part of the feudal idea still holds in the doctrine of eminent domain. According to this theory, all land belongs in reality to the state. The state is at liberty to take possession at any time that the land is needed for roads, railways, canals, public buildings, school houses, or other public purpose.

See CASTLE; KNIGHT.

While the disorders were at their worst any man of courage who could get together an armed force and fortify a dwelling, found the neighborhood ready to turn to him as its master. Other weaker landlords gladly surrendered to him their lands, to receive them back as "fiefs"; while they themselves became his "vassals," acknowledging him as their "lord" and, at call, fighting under his banner. In return, the lord promised these vassals protection in all just rights. The soldiery so provided afforded protection to other classes. The peasants saw that they were no longer to be slain or driven captive by chance marauders. They ventured to plow and sow, to raise crops and rear children. In case of danger they found asylum in the circle of palisades at the foot of the castle. In return for this security they cultivated the lord's crop, acknowledged him as their landlord, and paid him dues for house, for cattle, and for each sale or inheritance. The village became his village; the inhabitants became his villeins ("villains"). One master, however tyrannical, could not be so great an evil as exposure to constant anarchy. Hence there grew up peculiar privileges of the lord, which in later times came to be unspeakably oppressive and obnoxious, but which in origin were usually connected with some benefit conferred by him. The lord's services did not stop with defense against robbers. He slew the wild beast, and so came finally to have the sole right to hunt,—with atrocious game laws to preserve animals, large and small, for his pleasure. He was also the sole organizer of labor: he built the mill, the oven, the ferry, the bridge, the highway, with the labor he protected: then he took toll for the use of all these conveniences; and later he demolished the mill that the villeins would have built for themselves.—West, *Modern History.*

Later the masters of these castles were the terror of the country, but they saved it first; and though feudalism was to become so oppressive in the latter part of its existence, it had its time of legitimacy and usefulness. *Power always establishes itself through service and perishes through abuse.*—Duruy, *Middle Ages.*

The feudal possessions of the counts of Champagne were divided into twenty-six districts, each of which centered about a strong castle. All these districts were held as fiefs of other lords. For the greater number of his fiefs the count rendered homage to the king of France, but he was the vassal of no less than nine other lords beside the king. A portion of his lands, including probably his chief town of Troyes, he held of the duke of Burgundy. Chatillon, Epernay, and some other towns, he held as the "man" of the Archbishop of Rheims. He was also the vassal of the Archbishop of Sens, of

four other neighboring bishops, and of the abbot of the great monastery of St. Denis. To all of these persons he had pledged himself to be faithful and true, and when his various lords fell out with one another it must have been difficult to see where his duty lay. Yet his situation was similar to that of all important feudal lords.

It appears that he subinfeudated his lands and his various sources of income to no less than two thousand vassal knights. Some simply rendered the count homage, some agreed to serve him in war for a certain length of time each year, others to guard his castle for specified periods. A considerable number of the vassals of the count held lands of other lords, there being nothing to prevent a subvassal from accepting a fief directly from the king, or from any other neighboring noble landholder. So it happened that several of the vassals of the counts of Champagne held of the same persons of whom the count himself held.

It was evident that the counts of Champagne were not contented with the number of vassals that they secured by subinfeudating their land. The same homage might be rendered for a fixed income, or for a certain number of bushels of oats to be delivered each year by the lord. So money, houses, wheat, oats, wine, chickens, were infeudated, and even half the bees which might be found in a particular forest. It would seem to us the simpler way to have hired soldiers outright, but in the thirteenth century the traditions of feudalism were so strong that it seemed natural to make vassals of those whose aid was desired. The mere promise of a money payment would not have been considered sufficiently binding. The feudal bond of homage served to make the contract firmer than it would otherwise have been.—Robinson, *Western Europe.*

The obligations of the villein toward his lord were either rents in kind, as provisions, grain, cattle, or poultry, products of the land and farm; or labor or services of the body, the *corvees* in the fields and vineyards of the lord, the building of the castle or cleansing of the moat, the repair of roads, the making of furniture, utensils, horseshoes, plowshares, carriages, etc.—Duruy, *Middle Ages.*

"God has punished us for our sins," cries the chronicler of St. Denys, in a passion of bewildered grief, as he tells the rout of the great host which he had seen mustering beneath his abbey walls. But the fall of France was hardly so sudden or so incomprehensible as the ruin at a single blow of a system of warfare, and of the political and social fabric which rested on it. Feudalism depended on the superiority of the mounted noble to the unmounted churl; its fighting power lay in its knighthood. But the English yeomen and small freeholders who bore the bow in the national fyrd had raised their weapon into a terrible engine of war; in the English archers Edward carried a new class of soldiers to the fields of France. The churl had struck down the noble; the yeoman proved more than a match in sheer hard fighting for the knight. From the day of Crecy feudalism tottered slowly but surely to its grave.—Green, *History of the English People.*

Fever, a diseased condition in which the temperature of the body is increased abnormally. Fever itself is not a disease, but a symptom or condition dependent upon some derangement of the organs or functions of the body. Modern physicians look upon this elevation of temperature as one of nature's methods of throwing off infection, and tell us that if a disease of which fever is a usual result exists, a temperature somewhat above normal is desirable. Formerly, however, fever was regarded as the essential part of many diseases, and the names given such diseases in consequence are still in use, as typhoid fever, yellow fever, spotted fever, etc.

Fever is attended usually by a quickened pulse and an increase in the number of respirations per minute, by thirst and loss of appetite, and by lassitude. Often, especially with a slight degree of fever, the senses seem dulled, and the patient appears stupid. In other cases the senses are abnormally acute and there is great mental excitement. The skin feels hot and dry, and there is often headache and pain in back and limbs. A clinical thermometer is the only method of obtaining accurate information as to presence of fever. The normal temperature of the body is 98.6° F. A temperature not above 100° F. is regarded as light fever and in no sense dangerous. Temperature from 100° F. to 103° F. is called moderate fever, while above 103° F. is called high fever.

In typical fever cases there is a definite order of events, a period of onset, a period during which the symptoms remain about the same, and a period of decline. Moreover, with each day temperature rises and falls. The lowest point is reached in the morning. In the afternoon or early evening the temperature begins to rise and continues to advance until about midnight, when it commences to fall again. In high fever the patient is given only liquid food. Even slight fever calls for a semi-solid diet. When the fever is high the patient is kept more comfortable and the danger lessened by cool sponge baths given as often as

every half hour, or less frequently as the temperature seems to indicate. The head should be kept cool by an ice-bag or by compresses wet in cold water and changed frequently.

Fez, a city of northern Morocco. It is the capital of Fez, the most northerly province, once an independent kingdom. The capital is situated somewhat less than one hundred miles from the Atlantic. Among the Arabs Fez is a city of peculiar sanctity, ranking second only to Mecca. It contains over one hundred mosques. The city is also a seat of Moslem learning. Women are treated with more consideration than in some Arabian towns. There are a number of public baths. The city is beautified by numerous palm trees. It is the seat of a considerable caravan traffic with the oases of the Sahara. It is noted for manufactures of morocco, red fez caps, and silk shawls. The present population is about 140,000. See TIMBUCTOO; MOROCCO.

Fiat Money, from the Latin *fiat,* which means *let it be,* is money not intrinsically worth the amount stamped on its face and having no backing in the form of gold reserve. Usually, the term is applied in the narrow sense of having no money behind it in reserve, since many coins, though not worth the amount stamped on them, will be redeemed for that amount by the government issuing them. A government that is badly in need of money will order the making of a certain amount of base metal coins or paper bills, and will say "Let it be money," as in Germany and Russia since the World War, or as the American Colonial Government did. This kind of money obviously can have value only as long as a people has confidence in its government.

Fiber, any fine, thread-like part of a substance, as a natural filament of silk, wool, or cotton. In the manufacture of textiles and fabrics the name is given to any animal or vegetable substance which may be spun into thread or yarn. The most important fibers are the silk of the silkworm, the wool of sheep, the hair of goats and camels, cotton, flax, and hemp. Many other plants yield fibers which are in use for special purposes and which may become more important than they are at the present time. There are two groups of natural fibers. Commercial fibers are those used by manufacturers and are therefore of commercial value. "Native" fibers are used locally and are not yet an article of commerce. Commercial fibers number less than forty, but there are hundreds of native fibers possessing qualities which might make them as valuable as some of the commercial fibers, among which they may in time be numbered.

Fibrin, a substance formerly thought to be an aluminoid or proteid development in the blood which causes it to clot, but is now considered waste matter caused by incipient decomposition. Fibrin is obtained by whipping the blood with wire, twigs or glass rods. It is insoluble in water, but dissolves in an aqueous solution of nitrate of potassium. Normal human blood contains about 2.25 per cent of fibrin.

Vegetable fibrin is the residue left when gluten is boiled with alcohol; it is a grayish-white elastic mass.

Fichte, Johann Gottlieb (1762-1814), a German philosopher. He was born at Rammenau. He studied at Jena, Leipsic, and Wittenberg and became a private tutor. In 1793 he became professor of philosophy at Jena and was one of the most celebrated professors of that university during the time when it was most noted. On account of certain publications he was suspected of atheism, and, as a result of an inquiry, he resigned his professorship. Later he was appointed professor of philosophy at the University of Berlin. Fichte's system was founded at first upon that of Kant, but gradually took a somewhat different direction. His philosophy may be regarded as pure idealism. He maintained that the "ego," the "I,"—the thinking soul—is the only reality; everything else is illusion, or at least may be illusion; we cannot be certain that there is any outside world. The senses are not to be trusted as a means of obtaining knowledge. Fichte was a man of the strictest integrity and of the noblest impulses.

FICTION

Fiction, imaginary prose in narrative form. A story, or novel. Fiction makes no pretense of being true. It is thus distinguished from legend. The line of demarcation cannot be drawn exactly, however, since many legends, properly so called, because believed to be true at the time of composition, are later looked upon as pure fiction. This is especially noticeable in Section III of the outline which is to follow. It is probable that the stories of Arthur and Charlemagne were, for the most part, believed as originally told. We have come to regard them and to classify them as fiction. The outline is designed to give some faint idea of the history of fiction.

I. *Oriental Fiction.* The earliest fiction of which we have any knowledge is that of the oriental nations, notably of the Chinese and Hindus. The few specimens extant are of little interest, except to scholars. *The Arabian Nights'* is the best known example of later oriental fiction. It dates from the eleventh century.

II. *Ancient Classical Fiction.* The earliest fiction known to have existed in Greece are the *Milesian Tales.* They date from the second century B. C. They are no longer extant. A few examples of ancient Greek fiction and still fewer of Roman are in existence. They have little value from a literary point of view.

III. *Medieval Fiction.* The stories and tales belonging to medieval fiction were written, it must be remembered, in metrical form before they became fiction proper; that is, imaginary prose fiction. There are, during this period, three series of stories relating to three different personages:

1. Stories of King Arthur and his knights. This series is of Welsh origin.
2. Stories of Charlemagne and his paladins, of French origin.
3. Stories of Amadis of Gaul and his descendants, a series of widespread tales seeming to center in Spain.

IV. *Teutonic myths and legendary romances.*

V. *Modern fiction,* which of course, has been of gradual growth. The most important subdivisions are these:

1. German fiction.
2. French fiction.
3. Italian fiction.
4. Spanish fiction.
5. English fiction.

Oriental fiction and ancient fiction stand each by itself, influencing but not giving rise to that of medieval and modern times. Medieval fiction belonged root and branch to chivalry. Its pages are crowded with valiant knights, beautiful ladies, princes and princesses,—with giants, fairies, enchanted castles and wicked witches. This childish food satisfied the hunger of childlike people. It still has charm for all, and offers opportunity for something more than the mere tale, as Tennyson's *Idylls of the King* and Spenser's *Faerie Queen* demonstrate. This class of fiction remained in vogue when the days of knight errantry had passed and, naturally enough, was carried to an absurd extreme in the effort for novelty. It was destined to be extinguished by Cervantes' mock-heroic Spanish tale of *Don Quixote.* The hero is made to appear so ridiculous that this sort of tale was laughed out of literature. A generation of tales of rascals and rogues followed.

De Foe's *Robinson Crusoe* is regarded as the beginning of modern English fiction. It is made up from beginning to end. There are no mysteries or enchantments. All might have happened, and yet the reader is not led astray. Modern fiction is classified frequently as romances and novels. Romances are stories which have to do with the marvelous, mysterious, or supernatural; or which relate exciting events of some remote period. Novels deal with the incidents of ordinary life, and involve character study to a greater or less extent. The distinction between the romance and the novel is not one that can be drawn clearly. Sometimes the course of an ordinary human life is interrupted by stirring and marvelous incidents; so the novel and the romance touch and mingle. Moreover, there are stories which can hardly be classed as either. For convenience, fiction may be divided into four classes:

1. Romances.
2. Novels.
3. Juvenile fiction, including not only stories for children, but stories about children.
4. The short story.

It would be impossible to present a list of noted works of fiction on which many readers could agree. The following list may be regarded as fairly representative. These particular stories are chosen from the side of the reader rather than that of the literary critic.

ROMANCES.

Robinson Crusoe—Daniel De Foe.
Lorna Doone—Richard D. Blackmore.
Last Days of Pompeii—Edward Bulwer-Lytton.
Ivanhoe—Walter Scott.
Foul Play—Charles Reade.
Last of the Mohicans—James Fenimore Cooper.
The Black Arrow—Robert Louis Stevenson.
Ben Hur—Lew Wallace.
Daughter of Heth—William Black.
Ramona—Helen Hunt Jackson.
Romola—George Eliot.
Hugh Wynn—Weir Mitchell.
Alice of Old Vincennes—Maurice Thompson.

NOVELS.

Tom Jones—Henry Fielding.
The Vicar of Wakefield—Oliver Goldsmith.
Silas Marner—George Eliot.
Vanity Fair—William Makepeace Thackeray.
Oliver Twist—Charles Dickens.
House of Seven Gables—Nathaniel Hawthorne.
Jane Eyre—Charlotte Bronte.
The Egoist—George Meredith.
Far from the Madding Crowd—Thomas Hardy.
The Moonstone—Wilkie Collins.
Robert Elsmere—Mrs. Humphry Ward.
The Manxman—Hall Caine.
Les Miserables—Victor Hugo (French).
Uncle Tom's Cabin—Harriet Beecher Stowe.
The Hoosier Schoolmaster—Edward Eggleston.
Down the Ravine—Charles Egbert Craddock.
Red Rock—Thomas Nelson Page.
Richard Carvel—Winston Churchill.
Monsieur Beaucaire—Booth Tarkington.
John Halifax, Gentleman—Dinah Maria Muloch Craik.
The Little Minister—James M. Barrie.
The Man of the Hour—Octave Thanet.
Their Wedding Journey—William D. Howells.

JUVENILE FICTION.

The Jungle Books—Rudyard Kipling.
Green Mountain Boys—Judge Thompson.
Three Scouts—J. T. Trowbridge.
Two Little Confederates—Thomas Nelson Page.
Story of a Bad Boy—Thomas Bailey Aldrich.
Horse Shoe Robinson—John P. Kennedy.
Little Lord Fauntleroy—Frances Hodgson Burnett.
Prince and the Pauper—Mark Twain.
Ugly Duckling—Hans Andersen.
Timothy's Quest—Kate Douglas Wiggin.
Little Men—Louisa M. Alcott.
The Little White Bird—James M. Barrie.
Rebecca Mary—Annie Hamilton Donnell.
The Widow O'Callaghan's Boys—Gulielma Zollinger.

THE SHORT STORY.

The Brushwood Boy—Rudyard Kipling.
The Luck of Roaring Camp—Bret Harte.
The Gold Bug—Edgar Poe.
The Courtin' of T'nowhead's Bell—James M. Barrie.
A Doctor of the Old School—John Watson.
M'liss—Bret Harte.
A Conflict Ended—Mary Wilkins Freeman.
Marjory Daw—T. B. Aldrich.
The Man Without a Country—Edward Everett Hale.

Field, Cyrus (1819-1892), the American promoter of the Atlantic cable. He was a native of Stockbridge, Massachusetts. Having acquired wealth as a New York merchant, he turned his attention to the project of laying an Atlantic cable. He obtained a charter, giving him the exclusive right to land on the coast of Newfoundland for a period of fifteen years. An account of his attempts, discouragements, and final success may be found under CABLES.

Field, David Dudley (1781 - 1867), an American Congregational clergyman and author, was born in East Guilford, now Madison, Conn., and was a graduate of Yale. He was pastor of churches at Haddam, Conn., and Stockbridge, Mass. He wrote *A History of the Town of Pittsfield, Mass.*, and *A Genealogy of the Brainerd Family*. He was the father of David Dudley, Stephen Johnson, Cyrus West and Henry Martyn, Field.

Field, David Dudley (1805-1894), an eminent American jurist and law reformer, was born at Haddam, Conn. He was graduated from Williams College in 1825, and subsequently studied law at Albany and New York City. His career as a law reformer began with his admission to the bar of New York in 1828. He was unusually skillful as a lawyer and had an extensive practice, but devoted all his spare time to reform work. In 1847 Mr. Field began to prepare a civil code that was

subsequently adopted by almost all the states of the Union. He did not confine his reform activties to civil law, but became an authority on international law, and in 1873 was elected first president of an association that met in Brussels to reform and codify the law of nations. In politics Mr. Field was a Democrat, but he did not seek political honors. In 1876 he held the office of Congressman for a few months to complete an unexpired term.

Field, Eugene (1850-1895), an American journalist and author. He was born at St. Louis September 3, 1850. He spent a year as a student in Williams College, a second year at Knox College, and a third year in Columbia Missouri College. A friend who recalls his sophomore year at Knox describes him as careless of dress and fond of pranks, long hair, poetry, old books, and a corncob pipe. After six months in Europe, 1872, Field served successively as a reporter, editor, and managing editor on several papers in St. Joseph, St. Louis, Kansas City, and Denver. In 1883 he came to Chicago as a free lance on the *News,* which was later known as the *Record.* In 1889 he made a second trip to Europe. He died in Chicago November 4, 1895. As a newspaper writer he had a keen sense of the ludicrous and laid on unsparingly wherever he suspected corruption or hypocrisy.

Field was fond of practical jokes. In 1874, while touring in Missouri to report the political meetings addressed by Carl Schurz, he was requested, in the absence of the presiding officer, to introduce Mr. Schurz, which he proceeded to do in a chest tone as follows:

> Ladies and Chentlemens: I have such a severe colt dot I cannot make me a speedg tonight, but I haf die bleasure of to introduce to you my prilliant young chournalistic gompanion, Mr. Eucheene Fielt, who will spheak in my blace.

Quite a circle of booklovers were apt to gather in the rare book corner of McClurg's bookstore, especially upon the receipt of a lot of rarities from Europe. Field was the life of the circle, and took to publishing the sayings of "The Saints and Sinners Club," as he called them in his "Sharps and Flats" column of the *News.* As the years went by and Field began to gather reputation as a writer of verse, he was fond of surprising these cherished friends with a new poem. On New Year's Eve, 1891, he sent each member of the circle an invitation to meet in The Saints and Sinners' corner to watch the old year out. At the critical moment when "church yards yawn," he unexpectedly turned off the gas, leaving the store in deepest darkness; then, lighting a feeble candle, he proceeded to read his little audience an inimitable booklover's poem, "Dibdin's Ghost," newly written for the occasion. No one-volume edition of Field's poems is to be had. *A Little Book of Western Verse, A Little Book of Profitable Tales,* and *A Second Book of Verse,* probably rank in the order named. *Little Boy Blue* is perhaps his most popular poem, though the volumes named contain many lullabies and poems that appeal to all lovers of wife, home, and children.

The original MSS. of Field's most popular poems are becoming very valuable. At a bazaar held in Chiccago in 1917 for the benefit of European war sufferers, the manuscript of *Little Boy Blue* brought $2,400.

Talent, education, friends, books, and the untrammeled training of newspaper life combined to make Eugene Field a successful man of letters.

> An American of Americans, much of his verse was devoted to the celebration of what we may call the minor joys which go to make social happiness in the life he lived with so frank and rounded a completion. . . . He takes his America with just the same heartiness as his nonsense land; . . . We find the same honest resolve to accept the rules and to play out the game accordingly; the same conviction, that the game is in itself a good one, well worth the playing.—Kenneth Grahame.

> Eugene Field will always be remembered as the poet of child-life.

> Eugene Field won the hearts of "grown-ups" as well as children with his humorous, tender, dainty, and fantastic little songs.—J. W. Aber nethy.

A memorial monument to Field, bought with money given by school children, was unveiled in Lincoln Park, Chicago, in the fall of 1922.

Field, Marshall (1836-1906), an American merchant. He was born in Conway, Massachusetts. He had experience as clerk in a dry goods store at Pittsfield, Massachusetts. He came to Chicago as a clerk when the city had 50,000 people. In 1865 he organized a new retail dry goods store, which in 1881 took the name of Marshall Field and Company. Mr. Field was very successful as a business man. He made it a rule never to borrow money, never to give his note. His house lost in the Chicago fire of 1871 but was rebuilt at once. The new retail store of the firm occupies half a square, and is twelve stories high. During his lifetime, Mr. Field gave the city a million dollars for the Columbian Museum. He gave the University of Chicago land and other property valued at half a million. Such money as could be spared from his dry goods business, Mr. Field invested in real estate, United States Steel, Chicago & Northwestern Railway, Pullman Car stock, etc. In point of wealth, he was the third richest American. He was surpassed only by Rockefeller and Carnegie. At his death he left an estate valued at from $120,000,000 to $200,000,000, the greater part of which passed to a grandchild, still a schoolboy.

Field Glass, a small magnifying instrument used chiefly by military men, naturalists and sportsmen. It is made in the form of two small telescopes varying in length from five to ten inches and having within the tubes a system of reflecting prisms that act as magnifiers. Field glasses are of different powers, magnifying six, nine, twelve, etc., times. A glass with a magnifying power of six diameters will increase the surface of the object viewed thirty-six times; one magnifying twelve diameters magnifies the object 144 times. The most powerful glasses are used by military men and commanders of ships.

Field Museum of Natural History, is situated in Grant Park, Chicago, on the lake front. It was the gift of Marshall Field, Chicago merchant, who intended it as a lasting benefaction to his fellow citizens. The building is of white marble, in the Greek style of architecture, and has been called the "glory of Chicago." It is 700 ft. long, 350 ft. in depth and 80 ft. in height, and the construction includes an elaborate terrace. The museum was opened to the public April 28, 1921. The site was granted by the South Park Commissioners, with the stipulation that it was to be open free to the public three days of each week, namely, Thursdays, Saturdays and Sundays.

The Field Museum, while still young, is yet firmly established as one of the leading scientific institutions of the world. The scope and extent of the collection may be gathered from the fact that it took over a year to move the exhibits from the old location, Jackson Park, to the new quarters.

The exhibits include Chinese archeology; specimens of living and extinct animals in their natural habitat, fossils; a remarkable collection of gems, pagodas, costumes, boats, idols, musical instruments; weapons; a fine collection of crystallized and wire gold and gold nuggets, and numerous other objects equally noteworthy.

It is the intention to extend the service of the institution in a practical way into the economic, educational and industrial life of the community. Through the school exhibition work, provided for by the late N. W. Harris, of Chicago, collections of birds, small animals, plants, ore, rocks and minerals are circulated, as well as economic collections dealing with practical phases of natural production and distribution, geography and commerce.

There are also industrial exhibits which show processes of sugar production from cane and beets; the rubber industry and the sources of the raw material from all parts of the world; coal exhibits; processes of refining metals; ores yielding precious metals, and hundreds of others that are of absorbing interest to those engaged in industrial pursuits.

Field of the Cloth of Gold. The name applied to the place near Calais in France where King Henry VIII of England met the French king Francis I in 1520. The purpose of the meeting was to arrange a treaty of alliance between France and England against Germany, but no definite re-

sult was reached. Because of the magnificent display on both sides, the above name was applied to the place of meeting. See CLOTH OF GOLD.

Fielding, Henry (1707-1754), an English novelist. He is the literary successor, but not follower of Richardson. He was educated at Leyden for the law, but betook himself to a roistering life and to the writing of comedies. He inherited money and an estate, but wasted both in riotous living. He sneered at Richardson's ideals of virtue as hypocritical. He wrote *Joseph Andrews* as a caricature on *Pamela* and *Amelia* as a substitute for *Clarissa.* Parson Adams in the latter is a noble character, neither spoiled nor soured by poverty. *Tom Jones* is a vigorous novel valued for the picture it gives of the active young man of England, and the state of society in which he moved. Like Richardson, Fielding is to be read for a view of society in his day, not for pure pleasure, as Scott's *Ivanhoe* is read.

QUOTATIONS.

This story will not go down.
Penny saved is a penny got.
Enough is equal to a feast.
Much may be said on both sides.
I am as sober as a judge.

Fielding writes with his eye sharply fixed on the world. The most of his characters seem alive and vigorous. Except in the cases of Tom Jones and Captain Booth, who are Fielding himself, Fielding appears to be listening with considerable curiosity to the conversations of his characters, and wondering what they will do next.

Fielding, William Stevens (1848-), a Canadian journalist and statesman, was born at Halifax, Nova Scotia, and was educated in the public schools there. In 1864 he took a position as reporter for the Halifax *Morning Chronicle,* later becoming the managing editor of the paper. He entered politics, and in 1882 was elected a Liberal member of the Nova Scotia legislative assembly. Later in the same year he declined the provincial premiership tendered him by the Liberal Convention, but afterwards became a member of the ministry formed by William Thomas Pipes. When the latter resigned in 1884, Fielding succeeded him, and filled the position of provincial premier until 1896. In the same year he was elected to the House of Commons, and was appointed Minister of Finance of the Dominion. He held this position for fifteen years—until 1911—a term without precedent in Canada. During this period Fielding was in a great measure responsible for the financial policy of the Liberal party. In 1897 he introduced a measure which imposed higher duties on luxuries and lower duties on necessaries. This was particularly noteworthy, inasmuch as it contained a clause which gave preference to goods manufactured in Great Britain. He represented Canada at different times on imperial commissions and at conferences in London, and in 1907, together with the British Ambassador at Paris, negotiated the Franco-Canadian Commercial Treaty; in 1909 the Supplementary Treaty, with France, and in 1909-10 commercial arrangements with the United States, Belgium, Italy and Germany. In 1903, while Fielding was Acting Minister of Railways, he was instrumental in putting through the negotiations which resulted in the agreement to build the Transcontinental Railway. In 1910-11 he was a delegate to Washington in behalf of the reciprocity treaty with the United States. This resulted in the fall of the Laurier Ministry, and his own defeat for reelection to the House of Commons. Fielding also introduced many beneficial amendments to the banking and insurance acts of Canada. After the fall of the Laurier administration, while not in Parliament, he was the chief financial authority of the Liberal opposition. He declined knighthood in 1902, and later reentered the field of journalism in Montreal.

Fields, James Thomas (1817-1881), an American publisher, editor, and author. He was born at Portsmouth, New Hampshire. In 1834 he went to Boston, where a few years later he became junior partner in the firm of Ticknor, Reed, and Fields. Later this firm was changed to Ticknor and Fields and again to Fields and Osgood. He was editor of the *Atlantic Monthly* from 1861 until 1871. His published books include two volumes of poems,

and several prose works, of which the best known are *Yesterdays with Authors, In and Out of Doors with Dickens, Underbrush, Barry Cornwall and Some of His Friends.* Mr. Fields was a successful lecturer and was the author of many essays and critical reviews, not published in book form. Much of what is best in American literature has reached the public through Mr. Fields as publisher. Hawthorne's *Scarlet Letter* was one of the books whose beauty and power Mr. Fields was the first to perceive. The author believed its somber character would be a hindrance, and had little hope of success. Mr. Fields insisted on its publication. To the soundness of his judgment, the fact that five thousand copies, the entire first edition, were sold within two weeks sufficiently testifies.

Fiesole, fē-ā′sō-lĕ, ancient Faesulae, a small town of Italy. It is situated four miles northeast of Florence. The town is rich in antiquities and architectural treasures. A large Roman theater, cloisters, a Romanesque church, and a cathedral are considered as interesting as anything in Florence. Tourists not in too great haste make a side trip of a day to Fiesole. The theater is imposing. Over twenty tiers of seats, some of them rock-hewn, radial stairways, vaulted substruction, and arched entrances, taken in connection with the enormous size of the building, indicate that Fiesole was a populous sporting city when Catiline made it his headquarters 63 B. C. The chief local industry is now the braiding of hats.

Fife, a wind instrument resembling the flute. The melody is produced by blowing through a hole in a reed or tube. The current of air is regulated by opening and closing six holes with the fingers. A single key is sometimes added. The instrument has a compass of two to three octaves according to the skill of the player. The player of the fife may be recognized in the rock sculptures of the most ancient civilizations. Its notes are especially stirring. Fife and drum are associated traditionally in military music.

Fifteen Decisive Battles. In a famous book written in 1851, the British historian Sir Edward Creasy, enumerates fifteen battles, from Marathon to Waterloo, as the most influential in shaping the course of events for the Western world after each was fought. Numerous other battles of world importance have been fought since Waterloo, but it remains for some future historian to say how wide was their influence. The engagements that Creasy considered as the most decisive are listed below:

(1) MARATHON (490 B. C.). Here, on a shallow plain facing the sea, a courageous band of Greeks under Miltiades defeated a vastly superior Asiatic force led by Darius I, a Persian king whose ambition was the conquest of Europe. The defeat inflicted by the Greeks was, in view of their numbers, one of the most severe that history records; and it also indicated what later battles between forces of the West and East proved—the superior fighting qualities of the Occidentals. See MARATHON.

(2) SYRACUSE (413 B. C.). This conflict marked the end of Athenian expansion westward, and contributed greatly to the decline of Athenian supremacy in Greece.

The Syracusans, aided by the Spartan, Gylippus, nearly annihilated the invading Athenians, and thereby prepared the way for the subsequent dominance of Sparta, Macedonia and, lastly, Rome. See SYRACUSE.

(3) ARBELA (331 B. C.). Here the Persian host under Darius III was defeated by the invading Macedonian, Alexander the Great. Darius' force greatly outnumbered that of Alexander, but the superior prowess of the invaders compensated for their lack of numbers. This battle made it evident that European civilization was to dominate the world. See ALEXANDER THE GREAT.

(4) METAURUS (207 B. C.). This battle decided the fates of Hannibal, bitter foe of Rome, and of Carthage. Hasdrubal, Hannibal's brother, was leading a Carthaginian force to the latter's aid, but was met and conquered by the Romans at the Metaurus River. Hannibal was forced to withdraw; and not long after, the site of the once proud city of Carthage was

furrowed by the plow. See PUNIC WARS.

(5) TEUTOBURG FOREST (A. D. 9). Here the German chieftan, Arminius, defeated and almost annihilated the invading Romans under Varus, and thus made Roman subjugation of the German tribes impossible.

(6) CHALONS (451). Attila the Hun was turning southern Europe into a ruin, but at Chalons he was opposed and routed by a force of Visigoths and Romans led by the Visigoth king, Theodoric. But for this defeat of Attila, the European civilization of centuries might have been obliterated. See CHALONS.

(7) TOURS (732). Before 732 the Saracens had swept through western Asia and northern Africa, and were bent upon replacing Christianity with Mohammedanism in Europe. But at Tours they met and were routed by the determined Christians under Charles Martel, or Charles the Hammer.

(8) HASTINGS (1066). William the Conqueror invaded England, deposed Harold and made himself king, and established the Norman control of the British Isles. The result of William's victory was a profound change in the course of English life—political, social and artistic. Gradually the Normans lost their separate identity in the mass of the English people.

(9) ORLEANS (1429). Until Joan of Arc appeared and forced the English to raise the siege of Orleans, it seemed that France was certain to be conquered and ruled by the invader. The defeat of the English, however, made possible the coronation of the French king and the establishment of a secure French state. See JOAN OF ARC; ORLEANS.

(10) THE SPANISH ARMADA (1588). The Spaniards prepared this great fleet with a view to invading England and restoring that country to Catholicism. Foul weather and the British fleet destroyed the Armada and Spain's naval supremacy at the same time, and insured the right of the British to worship as they chose.

(11) BLENHEIM (1704). This battle, fought during the War of the Spanish Succession, between an allied force under the Duke of Marlborough, and the French and Bavarians, stifled the ambitions of Louis XIV of France, and perhaps saved Europe from French domination. See BLENHEIM.

(12) PULTOWA (1709). The time had come in the affairs of northern Europe when a contest between Sweden and Russia was inevitable. One or the other was to rule. At Pultowa, therefore, the issue was decided. The forces of Peter the Great of Russia defeated the army of Charles XII of Sweden. This resulted in the strengthening of the Russian Empire and brought Russia directly under the influence of European civilization.

(13) SARATOGA (1777). The future of America was decided by this battle and the events immediately following it. The colonists under Gates met and defeated the British under Burgoyne, and resulted in the resolve of the French to aid the colonists in their struggle for independence. See REVOLUTIONARY WAR IN AMERICA.

(14) VALMY (1792). The success of the French Revolution was threatened by the allied Prussian and Austrian forces under the Duke of Brunswick, but at Valmy the French decisively defeated the Allies, and the revolutionists fought on until their demands were granted. See FRENCH REVOLUTION.

(15) WATERLOO (1815). This battle marked the close of one of the most remarkable careers in history—that of Napoleon. He had massed his forces for a drive against the Allies under the Duke of Wellington. The French were defeated and the greatest menace to the peace of Europe was removed. See NAPOLEON; WATERLOO.

Fig, the fruit of a tree that is native to the countries around the Mediterranean Sea, but now successfully grown in several states of the United States, notably California. There are about 100 kinds of figs. When ripe, the fig is pear shaped and varies greatly in color, being green, red, yellow or blue-black. Strictly speaking, the fig does not develop from a flower, but is the container of the flowers that blossom on its inner surface. Smyrna figs,

the finest that grow, need the aid of an insect called the fig-wasp to bring them to maturity. The inedible capri fig is the host plant of the fig-wasp, which, in searching for a place to lay its eggs, crawls over the flowers of the Smyrna fig tree and pollenises them. Without this assistance the Smyrna fig does not properly mature. American agriculturists spent ten years in the effort to transplant the fig-wasp to the United States, and finally succeeded. The best American figs are grown in California.

The fig is not only a delicious, but a most wholesome, article of food, owing to its value as a laxative.

Figures of Speech, in rhetoric the intentional use, for the sake of effect, of words in forms or with meanings differing from those assigned them commonly. If we speak of "pansy faces," for example, we are using a figure, for pansies have no faces. Many expressions which once must have been figures have ceased to be so, having become as common as the more literal expression. "The roaring sea," "the whistling wind," "the running river," are expressions of this sort.

There are many varieties of figures. Metaphor, simile, synecdoche, metonymy, personification, are used primarily for the sake of clearness. Apostrophe, vision, interrogation, hyperbole, irony, antithesis, climax, and exclamation are used for emphasis. Alliteration, onomatopoeia, and allusion are used for ornament chiefly, although they may also give emphasis.

Metaphor, simile, and alliteration are treated in special articles. Synecdoche and metonymy are varieties of metaphor; in the former a part is made to stand for the whole, or the whole for a part. When Jacob says, "Then shall ye bring down my grey hairs with sorrow to the grave," he uses the figure of synecdoche. In metonymy some object accompanying or closely associated with the one to be named is used in place of it, as for instance "the kettle boils."

The figure personification endows inanimate objects, or abstract ideas with life and reason. This is one of the most common of figures. It is a most natural one also. Children personify their toys and other belongings. Primitive nations personified the objects of nature. Examples of personification are:

"The Ocean old . . .
Paces restless to and fro."
"The forests, with their myriad tongues,
Shouted of liberty."

Thomas Moore personifies the rose in his song, "The Last Rose of Summer."

Apostrophe is that figure in which the dead are addressed as living or the absent as present. Longfellow's *Skeleton in Armor* is a good example. The poem would lose its effectiveness were the ideas expressed in plain narrative. Interrogation consists in asking a question purely for effect, when no answer is expected. It is one of the commonest figures in oratory. Hyperbole is a figure which exaggerates. It must be of such a character as to show clearly that there is intended exaggeration. If properly used it is very effective. When David in speaking of Saul and Jonathan says they were "swifter than eagles, they were stronger than lions," the figure is hyperbole. This same figure may be humorous without losing its force. Dickens in *Christmas Carol* uses it—"In came Mrs. Fezziwig, one vast, substantial smile." Irony expresses the contrary of the idea which it is desired to convey. When the school boy calls out to his companion "My, but you're smart," he is using the figure of irony. Irony has been used by many authors, perhaps by none with more effect than by Thackeray. Antithesis gives emphasis by setting off one idea in contrast to another as, "Sink or swim; live or die; survive or perish." Climax depends upon the character of the thought, which must progress in the same direction until a point of high intensity is reached. Oftentimes an entire discourse forms a climax. "I came, I saw, I conquered," is a good illustration of the brief form of climax. Exclamation is the sudden expression of emotion. It may be employed by the use of ejaculatory words, or by the interrogative form of sentence. In speaking, the voice alone may change plain discourse to the figure of exclamation. Alliteration is the figure which employs in the same sentence—

usually in juxtaposition—words having the same initial letter. It is especially common in poetry. Vision, the speaking or writing as if some scene in the past or future were realized in the present, is a powerful and beautiful figure, but can be used only by a master. We find instances of it in the prophetic books of the Old Testament. Onomatopoeia, is the use of words whose very sound helps to convey their meaning. Patter, clatter, rattle, hiss, bang, shriek, buzz and many other words are onomatopoetic. Allusion greatly enriches any variety of composition. It consists in alluding or referring, without explanation, to well-known characters, places, events, etc. Lowell alludes to Moses meeting God upon Mt. Sinai in the lines,

"Daily with souls that cringe and plot,
We Sinais climb, and know it not."

Allegory is a narration of fictitious events in which it is designed to teach some moral truth. The parable and fable are subdivisions of the allegory. *Pilgrim's Progress* is one of the best-known allegories.

To use figures to some extent is natural, to overdo the matter is a common fault of the young writer. The imagination should be so trained that figures occur readily, but judgment and discrimination in their use are necessary to their effectiveness.

See ALLITERATION; METAPHOR; SIMILE; BUNYAN.

Figurine, a term used in sculpture to represent a small figure or group of connected figures, more especially when of ivory or terra-cotta. The best known, perhaps, are the Tanagra figurines, made in the third or fourth century B. C. at Tanagra in Boeotia. Though such work was common among the Greeks, these figures at Tanagra were the first to gain the attention of modern scholars. They are of terra-cotta, and of unusual excellence. They are prized not only for their artistic delicacy but also for their archaeological interest.

Figworts, a family of flowering plants, chiefly distinguished by a two-lipped or irregular corolla. They include a wide range of plants, some 2000 species, from small herbs to great trees. To this group belong many of our common flowers, such as the snapdragon. The Paulownia tree, a native of Japan, is a figwort. It grows to a height of 40 feet, is somewhat like the catalpa in habit, and has large clusters of pale violet flowers.

Fiji (fē′jē) **Islands,** an archipelago in the South Pacific 2,000 miles east of Australia. There are over 200 islands, 80 of which are inhabited. The islands were discovered by Tasman in 1643. The natives were fierce, curly, bushy-haired people, horribly given to eating each other. War parties were on the skirmish to secure victims for their feasts. The "Fiji Islander" became known as a type of the lowest grade of mankind. The Wesleyan missionaries opened stations in 1835. Catholics also entered the field. The people have been turned from idolatry and cannibalism. In 1920 there were 78,670 attendants of the Wesleyan church and 11,072 of the Catholic. In 1874 the archipelago became a British possession.

The islands have a total area of 7,435 square miles and a population of 165,000 of whom about 75,000 are foreigners. The highest elevation is 4,000 feet. The soil is a rich yellow, fertile loam of volcanic origin. The breadfruit, arrowroot, banana, plantain, cocoanut, nutmeg, cotton, sugar-cane, vanilla, peanut, yam, tobacco, rice, pineapple, tea, and maize are cultivated. Cattle, sheep, goats, and hogs have been introduced. The plant life resembles that of the East Indian mainland. Palms, tree-ferns, bamboos, and gigantic orchids are noticeable. Bats and a few rodents are the only mammals. There are fifty species of birds. Gay parrots and doves occupy the tree-tops.

Europeans have been attracted by opportunities to make money. There are 1,544 schools, 200 miles of telephone lines, a postal system, 4 newspapers, 134 local coasting vessels. Business is transacted chiefly with Australia. There are indications that the native population may be run out sooner or later by the British, as has proved the case in Australia, and that the Fiji Islands may become a state of the Australian Confederation.

Filbert, the nut of the common hazel of Europe. It is an important nut of commerce, being widely cultivated. The name cobnut is sometimes given to the round nuts, filbert being more properly applied to the elongated varieties. See HAZEL.

File, a steel hand tool having its surface covered with ridges. It is used for shaping metals, wood, and other hard substances. In making, a file is first forged to the required shape and size. While still soft the ridges or serratures are made by blows of a sharp edge like that of a cold chisel. Until the middle of the nineteenth century the cutting of a file was done by hand, but the cutting is now done usually by filemaking machinery. The greatest skill is required in tempering a file. If it be made too hard, the teeth are brittle and break away; if too soft, they are worthless. A file is different from a rasp in that the cutting edges lean slightly toward the point. In use, a file should be pushed from one, not rubbed to and fro. Various names are given according to cross section; as the flat, the triangular, the half round, and the round or rat-tail. The end of a file which is fitted into a handle is called by the file maker the tang,—possibly a corruption of tongue. The dentist's file is provided with a roughened surface at each end, the central portion being used for a handle. The smallest files are manufactured for the use of the watchmaker. They are scarcely larger than a cambric sewing needle. When files were made by hand and were necessarily expensive, it was customary to take an old file to the blacksmith to have it softened, resurfaced, and tempered again; but machine-made files are seldom resharpened. According to the latest census report, there are about 6,000 persons in the United States engaged in making files. The annual output in 1919 was valued at $17,616,000, reckoned at factory prices.

The first successful file-cutting machine was invented in 1865 by W. T. Nicholson, of Providence, R. I., and this machine with its subsequent improvements and modifications is now extensively used, after the bars of steel are first forged by hand or machine and ground smooth. The operations performed by the file-cutting machine upon the smoothed blanks are similar to those formerly performed by the hands of skilled workmen, which were thus described by Holtzapffel:

"The first cut is made at the point of the file; the chisel is held in the hand at a horizontal angle of about 55 degrees with the central line of the file, and with a vertical inclination of about 12 to 14 degrees from the perpendicular. The blow of the hammer upon the chisel causes the latter to indent and slightly to drive forward the steel, thereby throwing up a trifling ridge or burr. The chisel is immediately replaced on the blank and slid from the operator, until it encounters the ridge previously thrown up, which arrests the chisel and prevents it from slipping farther back and thereby determines its succeeding position. The heavier the blow, the greater the ridge, and the greater the distance from the preceding cut at which the chisel is arrested. The chisel having been placed in its second position, it is again struck with the hammer, which is made to give the blows as nearly as possible of uniform strength; and the process is repeated with considerable rapidity and regularity, 60 to 80 cuts being made in one minute, until the entire length of the file has been cut with inclined, parallel and equidistant ridges, which are called the first course. So far as this one face is concerned, the file, if intended to be 'single cut,' would be then ready for hardening. Most files, however, are 'double cut;' that is, they have two series or courses of chisel cuts.

"In cutting the second course, the chisel is inclined vertically as before, at about 12 degrees; but its edge only a few degrees from the transverse line of the file, or about 5 to 10 degrees from the rectangle. The blows of the hammer are now given a little less strongly, so as barely to penetrate to the bottom of the first cuts; and from the blows being lighter they throw up smaller burrs, consequently the second course of cuts is somewhat finer than the first. The two series, or courses, fill the surface of the file with teeth, which are inclined toward the point of the file." The

final process is to temper and harden the cut file.

Filefish, the common name for a group of fishes, so called from having their bodies covered by hard projecting scales which resemble the teeth of a file. There are a number of species, generally small and unimportant, and for the most part resident in tropical seas. The muzzle is conical, somewhat elongated, and terminating in a mouth with teeth in both jaws. One species ranges as far north in the Atlantic as Cape Cod. It is about two feet in length and is conspicuous for its orange-yellow sides. Though most of the filefishes are plain, some are brilliantly colored.

Filibuster, fĭl′ĭ-bŭs-ter, a member of a lawless band. The word is Dutch, signifying a freebooter, rover, or buccaneer. Now that the days of piracy are practically over, the term is applied to a member of an armed party that interferes in the affairs of a foreign country for the purpose of producing a revolution. Such an expedition was conducted by Lopez from New Orleans against Cuba in 1851. In 1853 William Walker of California conducted a filibustering expedition against the state of Sonora, and in 1855 a second expedition against Nicaragua. Both of these leaders, it may be said in passing, were arrested and executed. In case of arrest and imprisonment a filibuster has no claim on his home government for protection. In 1895 Dr. Jamieson organized a raid against the Boer government in South Africa. Garibaldi's various attacks on the Papal States were in reality filibustering expeditions, although the final success of the cause which he espoused has given him the rank of a patriot and revolutionist, rather than a filibuster. In parliamentary usage, a movement organized by the opposition party or a faction to obstruct the course of legislation is called a filibuster.

Filigree, ornamental work made of fine gold or silver wire. Copper also is used for the purpose. It is a sort of metallic lace work of a very light and elegant character, suitable for brooches, bracelets, crosses, embroidery, and other ornaments. Small grains or bits of metal soldered to a solid background are often interspersed with the wire work to give a variety of effect. Filigree is capable of being worked into many different forms, as arabesques, leaves, flowers, and the like. It is one of the most ancient kinds of jewelers' work. Fine specimens have been found in the tombs of the Greeks and the ancient Etruscans. The ancient artificers of India, China, Japan, and even of the Malay Archipelago were cunning makers of filigree. In the Middle Ages Genoa and Venice were famous for their manufactures of this sort of work. During the eleventh century the Irish were especially noted for the beauy of their filigree, a sort of skill which they subsequently transferred to the making of the celebrated Irish lace. The jewelers of Malta have a high reputation for this sort of work. In modern art the term is applied to any sort of metal or glass work, even to basketry, having a thread-like or lace effect.

Fillmore, Millard (1800-1874), the thirteenth President of the United States, must be listed among those who arose from poverty to the highest office in the Union, even though he succeeded to that office upon the death of another President. He was born in Cayuga County, New York, his birthplace now being within the limits of the village of Summer Hill. His father, a poor farmer, lost his little holding shortly after the future President's birth and was forced to take up an uncleared tract of poorer land at some distance from his first farm. Young Fillmore worked with his father clearing land until he was fourteen, when he was apprenticed to a manufacturer of carding wool and cloth. It is told that he was so badly treated by his employer that he once threatened the latter's life.

The apprentice bought his release in 1819, when he still had two years to serve, and went to Buffalo. Up to his nineteenth year, Fillmore did not own a book, had seen few that anyone else owned, and had received almost no instruction on any subject. He decided to study for the law, nevertheless, and was admitted to the bar in 1823. By 1827 he had established a considerable practice, but persistent hard work rather than brillancy was his

distinguishing feature. With the organization of the Whig party, Fillmore entered politics as a member of that party, and in 1828 was elected to the New York legislature, where he served three terms. During his service in this body he secured the passage of a bill abolishing the practice of punishing for debt.

During this time, Fillmore's ability and conscientiousness became more marked, but it also became apparent that he was not an initiator, a creator. Mildness and sincerity were his chief virtues.

In 1883 he was elected to the National House of Representatives, where he served until 1835, and was reelected in 1837, but declined a third nomination. During his last term in the House, Fillmore was chairman of the Committee of Ways and Means. He opposed the annexation of Texas because it would be slave territory, worked for Federal prohibition of interstate slave traffic, and was successful in having slavery abolished in the District of Columbia. After retirement from Congress he stood unsuccessfully for the governorship of New York, but was elected comptroller of that state in 1847. The Whigs nominated him for Vice-President in 1848 on the ticket with General Zachary Taylor for President, and both were elected.

Entering office at the time when the question of the extension of slavery was agitating Congress, he set aside Calhoun's precedent of not calling Senators to order for indecorous conduct on the floor, and conducted the affairs of the Senate in a notably intelligent and impartial manner. Upon the death of President Taylor in 1850, Fillmore was called to the Presidency. The old cabinet resigned, and Daniel Webster became Secretary of State. As President, Fillmore lost the support of the northern Whigs by signing the Fugitive Slave Law. His administration, however, save for the Compromise of 1850, was notably uneventful. Letter postage was reduced from five to three cents while Fillmore was President, and the first prohibition law was passed in Maine in 1851.

After the expiration of his term, President Fillmore tried to secure renomination, but was unsuccessful, but secured the nomination in 1856. He was defeated, and thereafter took an active interest, but no part, in politics.

Filter, a device designed to strain the solid particles out of a liquid. The word is akin to felt. The filter most frequently used in the chemical laboratory is a sheet of asbestos paper. It is folded usually in the form of a funnel and is of such a texture that solid particles are held back, while the liquid in which they were trickles through drop by drop. Filters for domestic purposes are packed usually with a layer of powdered charcoal or boneblack. Charcoal in particular makes one of the best filters known, as it absorbs noxious gases as well. Other filter materials are a sponge, mineral wool, powdered glass, etc. Even a piece of muslin cloth will arrest many of the impurities contained in water. Filters are used by the manufacturers of sirups, vinegar, oils, wine, beer, fruit-juice, and the like. Many city systems of water supply include enormous filters, acres in extent, having a bottom of fine sand, through which the water percolates and is purified before entering the pipes of the consumers. After a filter of this sort has been in use for a time, the sand becomes clogged and foul. Another filter must be employed while this sand is removed, and clean sand put in its place. There are air-filters also. Several hundred of these are in use at the outlets of sewers in London to destroy odors. They are also used in windows of rooms opening onto territory objectionable to the sense of smell. These air-filters consist of cages filled with fragments of charcoal.

Filter Presses, a form of strainers, which are used in the process of thoroughly separating liquids and solids more effectually. The filter may be but nominal, the cloth being used only for the purpose of holding the solids, which otherwise would be lost through the pressure and squeezing. The force applied may be given by hand, steam, or other power, and air pressure is also sometimes used. Well known examples of filter presses are the ordinary cider and cheese presses and the tankage presses used in garbage reduction works.

Finch, the largest family of birds. It comprises over 550 species. The name is interchangeable with sparrow and bunting. The grosbeak, cardinal bird, indigo bird, crossbill, snowflake, red-poll, goldfinch, chaffinch, linnet, bunting, and canary are all finches.

Goldfinch.

Findlay, Ohio., the county seat of Hancock Co., is pleasantly located on the Blanchard River, 45 miles south of Toledo. It is in the center of the rich oil and gas fields of Ohio, and in the vicinity of the city are valuable beds of clay, glass sand and gravel. Important manufactures are glass, pottery, pressed bricks, traction ditchers, electric insulators, gloves and shoes. There is an oil and a sugar refinery here. It is the seat of Findlay College, and has fine graded schools, a library and several public parks. The water works are municipally owned and operated. The population was 17,015 in 1920.

Fine Arts. See ARCHITECTURE; SCULPTURE; PAINTING.

Fingal's Cave, a noted cavern on the island of Staffa off the western coast of Scotland. A flood of volcanic rock contracted into perpendicular six-sided columns in cooling, as basaltic rock is apt to do. The waves on the stormy coast have broken their way through these loose columns or splinters to a distance of 227 feet into the cliff. The cave is 42 feet wide at its entrance, 22 feet wide at the rear, and 66 feet high. When the sea is not too rough tourists may enjoy a fine boat ride in this vast awe-inspiring chamber with vaulted roof and beautiful columnar sides. The cave is named for a legendary Celtic Chieftain. See FENIANS.

Finger Print Identification, a means of fixing the identiy of individuals by the characteristics of their finger prints. This method is widely used, in connection with the Bertillon system of personal measurements, in keeping records of criminals, and for various other purposes where a record of the identity of individuals is desired, Finger prints may be used, in the case of an illiterate, as a substitute for the signature on legal documents, or as a supplement to such signature; and some financial institutions in the United States and abroad have experimented with the use of finger prints as a means of identifying depositors and others when occasion requires. The most notable application of finger-print methods, however, is in the detection of crime, owing to the fact that the finger-prints of every individual present differing characteristics that are readily disinguishable, and these characteristics remain unchanged throughout the whole period of human life.

HISTORY. It is an interesting fact that every member of the human race carries from birth to death the delicate finger markings by which identity can be established. On the inner surface of every human hand there can be seen a number of very fine ridges which run in different directions and are arranged in definite patterns, of which there are four principal types, known as whorls, arches, loops and composites. There are similar ridges on the soles of the feet, and in both hands and feet they are known as papillary ridges. On the fingers they are especially marked, hence finger prints are generally used for purposes of identification. Prints

of the fingers are usually taken for record on pieces of paper or cards which are smeared or sprinkled with some substance that leaves an impression of the papillary ridges that can be photographed or otherwise preserved for future reference or use as evidence of identity. In criminal cases, such as burglary or theft, the criminal may accidentally leave an imprint of his fingers upon some object on the spot, such as a window-pane, a door, the knob of a safe or a knife-blade. Such an imprint may be photographed and enlarged for comparison with the records kept by the police. If it is indistinct it may be rendered clearer by being lightly sprinkled with a powder known as "gray powder," composed of mercury and chalk; when this is brushed off, the faintest imprint becomes more distinct. In other cases, as when imprints are made on greasy surfaces, a little printer's ink lightly smeared over the surface will bring out the impressions more distinctly. Such impressions of a criminal's fingers, when found to be identical in their markings with the finger prints of a suspected person, are regarded as evidence of his complicity in the crime, although convictions upon such evidence alone are rare in the United States in the absence of a general finger-print record. The English detective service, however, with headquarters at New Scotland Yard, London, has had many remarkable cases of finger-print identification and sets high value on the system, as supplying valuable clues to the perpetration of crime by known criminals.

The finger-print system was first used by the police of India, in the province of Bengal. It proved its value as a means of identfying native pensioners, when crooked friends and relatives, for instance, sought to impersonate them for the purpose of drawing their pensions after their death. The records of the pensioners' finger prints quickly stamped out this evil. Sir William Herschel, of the Indian Civil Service, was the first to invent a practical system of classifying finger prints, which was found necessary to enable indentities to to be readily established. Other Englishmen, including Sir Francis Galton, famous as a traveler and scientist, and Sir Edward R. Henry, commissioner of the Metropolitan Police of London, helped to develop the system.

Classification. As stated, finger prints are now classified in four distinct types of patterns. The whorls are those ridges that make a turn through at least one complete circle. The arches are ridges that run from one side to another, with no backward turn. In loops, some of the ridges turn backward, but have no twists; and the fourth type, called composites, includes all patterns which combine two or more of the other types in the same imprint. No two impressions of human finger-tips have ever been found to coincide exactly. Under the magnifying glass, the finger-print expert recognizes "deltas" and "cores" by means of which impressions are classified into over 1,000 separate groups, each of which may be further classified into many sub-groups.

The simplest way of taking a finger-print record is by pressing the finger tips on a piece of paper smeared with ink, and the simplicity of the system is in marked contrast with the expensive apparatus required by the Bertillon system of body measurements, called anthropometry, which it supplements to a valuable degree. There are now about 200,000 finger-print records on file at New Scotland Yard, and the system is being extended in use, not only throughout Europe and the British possessions but also in North and South America.

Finial, an ornament, usually carved, placed at the top of some pointed structure, as a spire, gable or pinnacle. These ornaments are found frequently in Greek architecture, as in the beautiful monument of Lysicrates. Finials became important ornaments in the eleventh century in Christian architecture, especially when steep roofs, pointed gables and the spires of Gothic buildings became the vogue. During the eleventh, twelfth and thirteenth centuries finials of exquisite form and infinite variety were seen on all the important features of the buildings of the time. Gradually finials came to have less boldness of outline, and by the sixteenth century they

had become longer and more attenuated. Finials were carved in stone as well as in wood, the latter with much beauty and delicacy. In finials dating from the Elizabethan period, the design is almost always of geometric form. In the purely classic finials are in the form of balls, etc., and used as terminations.

Finland, a former grand-duchy of Russia, proclaimed an independent republic, December 9, 1917. It is situated on the Gulfs of Finland and Bothnia. Area 149,586 square miles. One-ninth of this area is composed of lakes, connected by an extensive canal system. The Finns are related to their neighbors on the north, the Lapps. They are considered a doubtful branch of the Mongolian or yellow race. The population of Finland in 1919 was 3,335,237, including 350,000 Swedes, 6,000 Russians, 1,900 Germans, and a few hundred Lapps. In a hundred years the Russians have succeeded in gaining only about 50,000 adherents for the Greek Church, the rest of the people are persistently Lutherans.

The early history of the Finns is not well known, save that they were great pirates and gave Sweden much trouble until King Eric subdued them in the twelfth century and set up the Christian religion. In 1809 Gustavus IV ceded Finland to Alexander I of Russia under a formal pledge to protect the Finns in their religion (Lutheran), laws, and liberties, that is, self-government under a Finnish legislature. Alexander's successors did so with reasonable fidelity until 1899, when Nicholas II gave orders that legislation affecting the interests of Russia would be attended to by his imperial state council, thus gagging the Finnish legislature. By other edicts it was ordered that young Finns must serve five years in the Russian army, and that official business must be conducted in the Russian language, which is spoken by about one person out of three hundred. The universal discontent excited by these acts has stimulated a large emigration of Finns to Minnesota, North Dakota, and adjacent parts of Canada. Swedish affiliations in business, methods of legislation, education, religion, and political sympathies persisted. Finland stubbornly refused to Russianize.

In matters of wealth and improvements Finland is to be compared with Sweden rather than Lapland. Helsingfors, the capital, is on the Gulf of Finland. It is a beautiful city of 188,922 people, with fine streets, parks, and promenades. It is the seat of the Finnish university, attended by 3,478 young men and women. Finland has a complete system of town and district schools with over 50 high schools, a polytechnic school, 8 normal schools, 9 commercial, 24 agricultural, 28 dairy, 11 horticultural, and 7 navigation schools. Of the children of school age, all but 20,000 are in school, at least a part of the year.

Finland is, in the main, an agricultural and stock country. One hundred and eleven thousand peasants own their farms; two-thirds as many pay rent. Potatoes, oats, rye, barley, wheat, flax, and hemp are the chief crops in the order named. Of domestic animals, goats and poultry are raised in abundance. One hundred and nineteen thousand reindeer are reared in the northern part. Finland has excellent forests giving employment to many thousands of men. There are valuable iron mines. Finnish steel rivals that of Sweden. The chief articles of export are timber, butter, paper, paper pulp and cardboard, iron and iron goods, leather, hides, tar, and pitch. The chief imports are grain, coffee, sugar, ironware, cotton and cotton goods, machinery, chemicals, tobacco, and oils. Finland has over 4,000 manufactories. It has 500 savings banks with 614,652 depositors.

The government of Finland, according to its new constitution, is vested in the diet and the president, who is elected for six years by direct vote. It is progressive and makes little or no distinction of sex. The position of women is particularly honorable. The national university is co-educational. Since proclaiming its independence the country's vicissitudes have been many and varied. About the same time that Germany signed a separate peace with Russia, another treaty was signed with Finland, which had lately revolted against the Russian Bolshevists' rule. The treaty declared

that war had ceased to exist between Germany and Finland. Germany promised to do everything possible to secure world recognition of Finland's independence. Finland promised she would never give up any territory without first consulting Germany and a commercial arrangement was entered into which made Finland practically a vassal of Germany. The latter even tried unsuccessfully to create a kingdom out of Finland with a German prince upon the throne. For months Bolshevism, German cunning, and civil war were rampant.

STATISTICS. The following statistics are the latest from reliable sources:

Area, square miles	149,586
National forests, acres	29,894,695
Population	3,335,237
Chief cities:	
Helsingfors	188,922
Abo	59,914
Tammerfors	46,819
Viborg	30,039
Number of departments	10
Members of house of representatives	200
Members of cabinet	12
National revenue	$413,132,000
Bonded indebtedness	$60,814,000
Farm area, acres	7,654,000
Potatoes, bushels	18,215,000
Oats, bushels	28,029,000
Rye, bushels	10,385,000
Barley, bushels	4,939,000
Hay, tons	2,105,988
Flax and hemp, tons	951
Butter, pounds	329,640,000
Domestic animals:	
Horses	273,271
Cattle	1,100,486
Sheep and goats	827,791
Swine	110,993
Manufacturing establishments	4,098
Operatives	82,471
Output of manufactures	$291,631,160
Textiles	$52,092,140
Paper	$40,129,860
Lumber products	$28,165,760
Leather products	$33,477,480
Imports	$716,600,000
Exports	$677,140,000
Miles of railway	2,685
Number of elementary schools	6,414
Pupils enrolled	418,214

See LAPLAND; GOTLAND; BALTIC.

Finnish Literature. See LITERATURE.

Finsen, Niels R. (1861-1904), a distinguished Danish scientist. He was born on one of the Faroe Islands and died at Copenhagen. While a student in the University of Copenhagen Finsen began experiments on the influence of sunlight and electric light upon the diseases and blemishes of the skin. In 1890 he asserted that smallpox could be cured by admitting light to the sick room through red curtains. In 1894 an epidemic of smallpox prevailed in the city. This disease is due, it is believed, to the presence of hordes of inconceivably small animals in the body of the sick. The pock marks in the faces of victims are made by colonies of these protozoans, as they are called. Finsen demonstrated that red light not only killed out the germs in these spots and prevented patients from being marked, but also exterminated them from the system. Two years later, 1896, the authorities of the city hospital of Copenhagen were so far convinced that red light was a cure for smallpox that rooms were fitted up for this method of treatment and the Danish government took up the matter, endowed an institution, and placed it at the disposal of Professor Finsen.

This distinguished student made still another discovery,—that certain chemical rays, not Roentgen or X-rays, are a cure for the less virulent or surface forms of cancer. It would require pages to describe the experiments and the ray-producing devices of Professor Finsen. It is sufficient to know that patients pass day after day in easy invalid chairs, in large airy rooms, while attendant nurses manage lenses and focus rays from Finsen instruments on the cancerous spots hours at a time until the cancers are killed and the lives of the patients saved.

Queen Alexandra of England, who, it will be remembered, is Danish by birth, paid the expense of installing the Finsen cure in a London hospital. Finsen treatments for smallpox and surface cancer are almost as well known as that of Pasteur for rabies or hydrophobia. It is too soon to say that these diseases have been mastered; but many famous cures have been effected and life has been saved. Reports from Finsen Institutes in London, Paris, Berlin, and Copenhagen claim that fifty-one per cent, or a little over one-half, of

the patients who have attended these hospitals have been cured.

See SMALLPOX.

Fir, a coniferous, evergreen tree. The common fir grows from Maine to Minnesota and northward. It also follows the mountains to Virginia. In the most northerly or arctic part of its range it becomes a prostrate shrub. The seeds and bark bear minute cells of resinous balsam, whence, among lumbermen, the tree goes by the name of balsam fir. The leaves have a prominent midrib on the whitened lower surface, and are so arranged that the spreading branchlets seem flattened. The tips of fir branches are chosen by the hunter for a camp bed. They are laid with regularity, almost on end, so that the soft tips only are exposed. There are numerous species. The fir is the commonest coniferous tree of the Black Forest and of Switzerland. It is a valuable timber for masts and for housebuilding. The magnificent forest trees of the Pacific coast—the pride of the American lumberman—are mostly firs. A staff of Washington fir upholds the British flag above Windsor castle. Another is said to carry the Japanese flag at Tokio. See CONIFERS.

Fire, the heat and light noted when bodies burn. The ancients thought the universe composed of four elements: fire, air, earth, and water. The latter three are regarded still, not indeed as elements, but as compound substances; but fire is not a substance. It has no weight, none of the characteristics of a substance. Everyone knows fire when he sees it; yet the dictionary maker finds fire a difficult word to define. It is small wonder that the ancients thought fire a sort of gas that poured out of wood or oil when it burned. It was centuries before the chemist discovered that fire is a rapid union of carbon in fuel with oxygen of the air.

According to the mythology of the Greeks fire was the exclusive possession of the gods, until Prometheus stole it and conferred the gift on mortals. While it is quite conceivable that there may have been races of men so primitive that they did not understand the use of fire, it is as yet true that no tribes have been found so rude as not to understand how to produce fire and how to use it in the preparation of food.

It has been suggested that the first fire used by man was kindled by lightning. Several methods of making a fire were known among primitive people. A common method was that of rubbing a pointed stick in a groove until the heat of friction caused the particles of wood to ignite. The Indians had a way of producing fire by pressing a pointed stick upon a piece of wood with one hand. The other hand caused the stick to rotate rapidly by means of a sort of bow, the string of which was given a turn around it. It is needless to say that fires kindled in this laborious way were covered up carefully at night to prevent their going out. The Greeks, as well as the Chinese, understood the method of creating fire by the use of a lens or burning-glass.

The method of producing sparks by striking a piece of flint with steel is well known. As late as 1830 the housekeeper and traveler were never without steel, flint, and tinder,—the latter a box of carefully prepared lint or punk in which the falling sparks might catch and start a fire. Lucifer matches came into general use about 1835. The present generation can have little idea of the labor and care involved in fire-making in the early half of the nineteenth century.

When we consider how indispensable and precious fire is, it is little wonder that the carrying of fire to the hearthstone of a new home on the occasion of occupying a new house, or of a wedding, was held by the ancient Romans to be a religious ceremony. So important, so sacred, was fire, that the vestal virgins were set apart to maintain a perpetual flame on an altar. Nor does it seem strange that the fire worshipers of Persia should consider a flame the emblem of purification. The Mexican Aztecs kept sacred fires burning on their altars. These they extinguished once a year and proceeded with great solemnity to kindle a new fire by the friction of sticks.

While indispensable to civilization and most useful as an able servant, fire beyond control is one of the most destructive of

agencies. The amount of property that has been destroyed by fires is almost beyond calculation. The fires which sweep over our western prairies, sometimes at the speed of a trotting horse, are a sight worth travel to see. A prairie fire at night going before a high wind is a magnificent spectacle, though fraught with terror to the settler. The shortening of grass by pasturing, and the increase of plowed fields have made prairie fires on a large scale rare. One who is accustomed to the prairie feels little concern, however, as it is very easy to protect one's self by starting a local fire and falling in behind on the ground recently burned over.

Forest fires are a different matter. When an evergreen forest once catches on fire, there is occasion for alarm. Fires in woods of this sort sweep across large tracts in North America, leaving nothing in their rear but blackened stumps and ashes. In time of drouth the resin contained in evergreen boughs and leaves takes fire almost like powder. In addition to this, an electrical state of the atmosphere appears to be developed. A forest fire of this sort runs before the wind like a race-horse. It is almost impossible for those in its path to preserve their lives, save by plunging into streams until the fiery blast be passed. Many an Indian village and white settlement has been blotted out by a forest fire. In 1871 forest fires swept across Wisconsin and Michigan. Fifteen thousand persons were rendered homeless, and 1,000 lives were lost. September 1, 1894, northeastern Minnesota suffered a similar disaster by what is known as the Hinckley fire. In 1811 forest fires in the Tyrol, Switzerland, destroyed sixty-four villages and hamlets.

Every civilized country has its record of great city fires. In 64 Rome burned for eight days. No less than nine destructive fires are recorded for London; the first in 798, the last in 1861. The Great Fire of London took place in September, 1666. Over 13,000 buildings were consumed. The total loss of property was over $50,000,000. September 14, 1812, the Russians fired the city of Moscow to drive out the army of Napoleon. The fire burned for five days, consuming over 30,000 houses and inflicting a loss of $150,000,000. During the communistic outbreaks in 1871, following the Franco-Prussian War, it is estimated that over $150,000,000 worth of Paris property was destroyed by fire. Liverpool, Glasgow, Venice, Leipsic, Hamburg, Copenhagen, Stockholm, Christiania, Petrograd, Constantinople, Bombay, Canton, Yokohama, and Yeddo; in short all considerable cities have had destructive fires with corresponding loss of life. Quebec and Montreal have suffered.

In the United States, Boston has had five great fires; the first in 1679, the last in 1872. By this fire nearly a thousand buildings were consumed, and $75,000,000 worth of property destroyed. Charleston, South Carolina, has had three fires; New York City had a great fire in 1835, ruining 1,000 mercantile firms; another in 1845 destroyed many million dollars' worth of property. Thirty-five people were killed. St. Louis has had 3 destructive fires; Philadelphia, 2; San Francisco, 1; Chicago, 4. The Chicago fire of 1871 was one of the greatest fires of modern times. An area of 2,124 acres was burned over in the very heart of the city; 250 lives were lost; nearly 100,000 persons were made homeless. The loss of property was not less than $165,000,000. Baltimore was visited by a destructive fire in 1904. A fire following the earthquake of 1906 destroyed the business portion of San Francisco, causing a loss which has been estimated at $350,000,000.

The total property loss in the United States by fires during the forty-year period ending January 1, 1921, was $7,869,000,000. The present annual loss is about $178,900,000. New York averages 8,700 fires a year. Chicago has 4,100. The average record in this country is 3 theaters, 3 public halls, 12 churches, 10 schools, 2 hospitals, 2 asylums, 2 colleges, 6 apartment houses, 3 department stores, 2 jails, 26 hotels, 140 flats, and nearly 1,600 homes burned up every week in the year. The average family runs about one chance in sixty of being burned out some time during the year, thus making being "burned out" a rather remote contingency.

Firearms, a general name for the pistol, revolver, carbine, musket, shotgun, rifle, howitzer, and even cannon; in short, for all sorts of guns from which missiles are fired by means of explosive gunpowder. The origin of firearms is unknown, except that Europe got the hint from the East. The first form in use was the small cannon; then came a heavy musket that was rested on a support and fired with a burning match. The flintlock came next and was succeeded by the percussion cap, and the latter, in turn, by the cartridge with a percussion cap within at the base. The rifle, the favorite American firearm, was invented at Leipsic, about the time of the discovery of America. In the barrel are two or more spiral grooves that give a bullet a whirling or rotary motion, and cause it to carry farther and with greater accuracy than a bullet from a smooth bore. The revolving barrel was invented by Samuel Colt. It was placed upon the market about 1835. The breechloading rifle attracted attention in 1852. The number and variety of firearms are too great for enumeration here. The largest firearms factory in the United States is that of the Remingtons at Ilion, New York. Hartford is noted for gun factories. According to the last United States census, about 5,000 wage earners are engaged in the manufacture of firearms, producing a total annual output worth from five to seven millions a year, reckoned at factory prices.

In many European countries the general use of firearms is prohibited by law. The common people of Russia are not allowed to have guns of any sort in their possession. While not skilled in the manual of arms, it is safe to assert that the average American young man can handle a gun more intelligently than the average peasant soldier of any country in Europe. Owing to the large amount of open country and a prevalent love of sport, it is probable that, man for man, the Canadians are the best shots in the world. The people of the northwestern part of the United States would be inclined to dispute this statement; but the average for the United States is very much reduced by the large number of people who dwell exclusively in cities and are not familiar with outdoor life.

Fire Clay, a variety of clay used in the making of glass retorts, glass pots, fire bricks, crucibles, and the like. When found it is always a stratum immediately beneath a layer of coal. It must be a pure compound of silica and aluminum, free from an appreciable quantity of alkali, iron, lime, or magnesia. Articles made from a good quality of fire clay may be exposed to a temperature at which glass melts and ordinary pottery crumbles. Fire bricks made of this clay are able to withstand a heat at which ordinary bricks fuse and run into a glassy mass. In the various operations connected with blast furnaces and the different methods of making steel, it is requisite to have huge retorts, cupolas, crucibles, and fire-brick linings capable of withstanding 1,000°, 1,600°, 2,000°, 2,600° and even 3,000° of heat. See BRICK; POTTERY.

Fire Damp. See DAMPS.

Fire Engine, a machine for throwing a stream of water on a fire. A steam fire engine is an essential part of a modern city equipment for extinguishing fires. It stands in the engine house, under head of steam, fires burning, ready for instant use. Fireman under pay are ready for service day and night. When the electric signal is turned in, though the hour be midnight, the gong sounds, the stall chains drop, trained horses spring to their places at the pole, harness suspended in readiness drops on their backs, and an attendant fastens collar and bellyband with a click. In the meantime the men have thrust their feet into jackboots, clapped on their fire helmets, and, putting on their rubber coats as they whirl down a slide, take their places,—driver, fireman, and engineer,—on the engine. The bar at the door rises, the horses are away at a gallop. Ere seconds have grown to a minute, the powerful, hissing engine, glowing like a fire-breathing dragon, is off and around the corner on its way to the fire. A hose cart, galloping with equal speed, lays hose from the nearest reservoir or hydrant to the scene of the fire. A stream of water is turned on with the utmost haste, for a minute's delay at

the beginning of a fire may mean hours of work later and the destruction of a fortune. What with engines, hose carts, ladders, water towers, streams of water, leaping flames, and falling walls, the chief shouting hoarse commands through his trumpet, the line of obedient men, and the curious, anxious crowd of onlookers, a large city fire, with its attendant scenes, especially at night, is a sight well worth seeing.

In its essential features, the fire engine is a huge syringe or force pump, worked by steam. The larger portable fire engines are expected to throw from 900 to 1,400 gallons of water per minute. The smallest of the high type engines is designed to discharge 400 gallons a minute.

Though but recently brought to so high a degree of efficiency, the fire engine is not a modern invention. Hero of Syracuse, who flourished 150 B. C., described a force fire-pump operated, of course, by hand. Pliny, the Roman, wrote of the pumps used in that city to put out fires. Chemical fire extinguishers have been in vogue for centuries. The immediate predecessor of the steam fire engine is the hand engine or hand brake worked by two horizontal bars, after the manner of the hand car used by section men on a railroad. Many of the smaller towns still depend on a fire extinguisher of this kind, while in the large cities the automobile type is coming into favor.

A recent invention designed for the protection of firemen is a silk hood supplied with air from a reservoir carried on the back. One fireman provided with this headgear is said to have worked for fifty minutes in sulphur fumes.

Fire Escape, a contrivance for escaping from a burning building. The laws of most states require that theaters, hotels, schoolhouses, and all buildings of a public nature shall be provided with fire escapes. Many hotels provide a rope ladder for each room in the building. Iron stairways are built on the outside of many buildings to be used in case of emergency. Such stairways should be built always with numerous turns and landings. A straight iron ladder is of little service. In time of confusion, smoke, and danger, a person who loses his footing at the top of a straight ladder is likely in his fall to strip it of all who are on the rounds below him. This has happened more than once in a great fire, causing lamentable loss of life. One of the most ingenious devices is a metallic standpipe fitted with a spiral slideway within, like the screw of an auger. Persons slide down within this escape with the utmost security. The faster one slides, the greater his centrifugal motion and the more his progress is retarded. One may slide in this fashion from the top of a building several stories high without attaining a dangerous speed. Tall buildings in large cities are provided with outside iron stairways, which can be reached through doors or windows on each floor. Large public schools in cities have fire drills. Teachers and pupils are under instruction to leave the building immediately whenever the fire gong is struck. Whenever the signal is heard everything else is dropped. Without waiting to know whether the signal is for a real or imaginary fire, all form into line and pass outside. From 1,000 to 2,000 pupils can pass out from a properly constructed building in from fifty to ninety seconds.

Fire Extinguisher, a device for putting out a small fire, usually by water charged with carbon dioxide gas. A simple form is the hand grenade, a glass flask which, when thrown into the fire, breaks and liberates the gas. One very popular form consists of a cylindrical copper vessel lined with lead and holding about four gallons of water, in which has been dissolved some sodium bicarbonate. Above the water is a bottle containing sulphuric acid, with a loose glass stopper. Near the top is a small hose a couple of feet long with a nozzle. A tight cover screws on. To use, the vessel is inverted, whereupon the stopper drops from the bottle allowing the acid to run out and act upon the carbonate solution. The carbon dioxide gas generated creates considerable pressure which forces the gas-charged water through the hose to a considerable distance.

Firefly, a light-giving, usually nocturnal beetle, sometimes, but not happily, called a lightning bug. The glowworm of Eu-

rope is also a beetle, closely related to the firefly but it is wingless and crawls like a worm. The firefly family is a large one including many species. Those of the West Indies are an inch in length and give out a light by which small print may be read. A few put under a tumbler are sufficient, it is said, to light a room. Our common firefly is a familiar torch bearer. Its fitful gleams show that summer is at hand. As the warm, dewy evenings come on, there are few scenes more to be admired than a meadow with thousands of these little meteors in full play. On catching one of them—not the easiest thing to do—it appears to be a slender, soft beetle with flat wing covers which it raises fitfully, emitting a beautiful glow of light from the under side of its abdomen. Scientists have wondered not a little how so small an animal can emit so much light. A bit of burning tallow or a drop of oil, even with the utmost economy, is soon consumed. No way of converting fuel, heat, chemical action, or electricity into light has been devised or is conceivable without consumption of the light-producing material. Yet nature produces a myriad of soft, delightful evening lamps that glow and shine for hours without apparent loss of weight. Without doubt, however, the firefly derives its light from the food it eats. Beyond the fact that the light or phosphorescence is due to chemical action, it is little understood. See PHOSPHORUS.

"We have made a new profession, that of illuminating engineering, but we are still very far from the perfect artificial light," remarked a well-known inventor.

"Is there such a thing as a perfect source of artificial light?" asked one of his auditors.

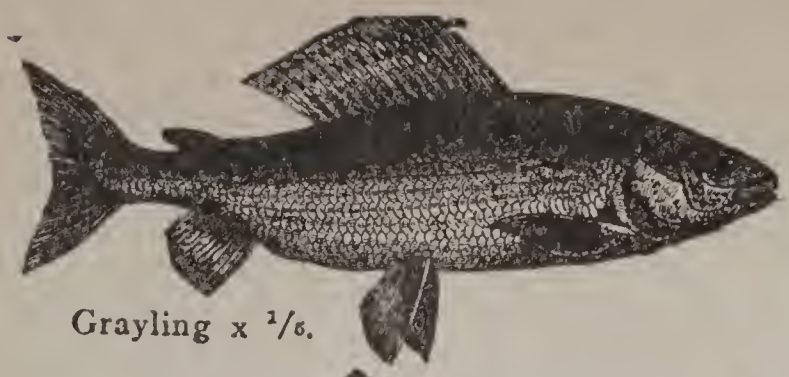
"Oh, yes, we already know of such a light. Almost everybody has seen this light, but all the wise heads in the world cannot read this simple secret which Nature has seen fit to bestow upon her most lowly forms of animal life Behind you sits a darkened cabinet; inside of it is a little box. Shake that box a bit and you will see the only perfect source of light known to man."

With eager faces the visitors crowded about the cabinet. Then with the look of disappointment one turned towards the inventor with the remark: "Why, there's nothing but glow-worms and fire-flies in that box!"

"Nothing but glow-worms and fire-flies," remarked the scientist, "and yet each one of those little creatures carries around a secret worth millions and millions of dollars. If I could discover that secret to-day. inside of a year I could make the fortunes made out of oil look like the widow's mite. For, do you know, each one of those fire-flies and glow-worms carries a tiny light which they turn on and off at will? This little light gives very little or no heat, whereas the best incandescent electric lamps we can make waste more than 90 per cent of the electrical energy in useless heat for what little light they give. Take that sixteen-candlepower lamp above you, for instance; it consumes fifty watts of electricity to produce sixteen candlepower of light. Only two watts of this go to make the light and forty-eight watts are wasted in heat. If I could reverse those conditions I could get twenty-four times as much light, or 384 candlepower, from the same amount of current. Fire-flies and glow-worms know the secret of light without heat,—man does not. But some day we will read this puzzle, as we have read so many before, and the nights will be as day. In the depths of the ocean even the penetrating light from the sun is barred, yet there is light, and electric light, too. Almost every one of those deep-sea creatures carries a tiny light similar to that of the fire-fly,—a light that can be turned on or off at will. We assume that the 'electricity' for this light is produced by nervous energy; beyond this we really know nothing."—Donald Cameron Shafer, in *The Technical World.*

Fireplace. See HEATING AND VENTILATING.

Fireproofing, the act or art of rendering fireproof; or the substance or material used for making anything fireproof. Fireproofing has been developed to an important extent in recent years, as new methods and materials for the purpose have been discovered and the public has taken greater interest in protection from fire. Many things are now so constructed or protected as to be incombustible, or nearly so. Buildings are rendered fireproof by the exclusive use in their construction of non-combustible materials, including stone, brick, terra-cotta, steel, iron, cement, concrete and asbestos. In the case of textile fabrics, such as cotton and linen, the means adopted for fireproofing them is saturation with various salts, as borax, alum, zinc sulphate, etc., which leave their crystals in the substance of the fabric. Wood may be protected by silicate of soda, which on the application of strong heat fuses into a glass. This not only envelops the outside, but also fills the interior pores of the wood, thus shielding it from contact with the

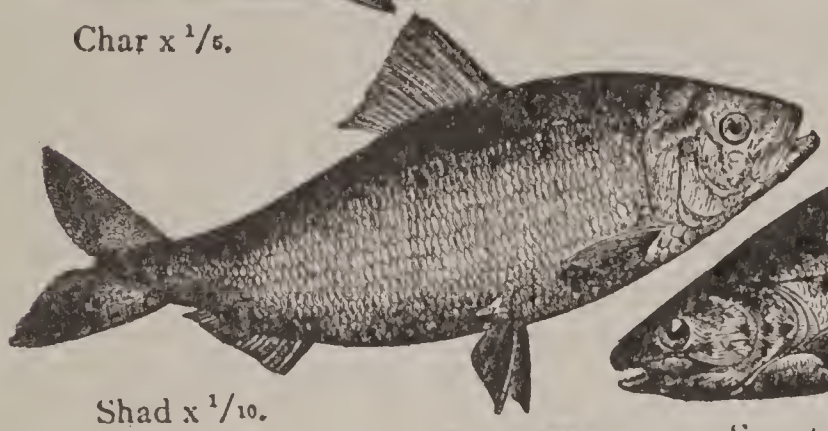


Grayling x 1/6.

Bluefish x 1/6.

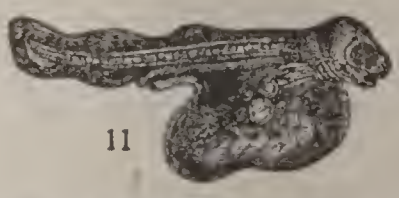
Char x 1/6.

Whitefish x 1/7.



Shad x 1/10.

Sea trout x 1/10.



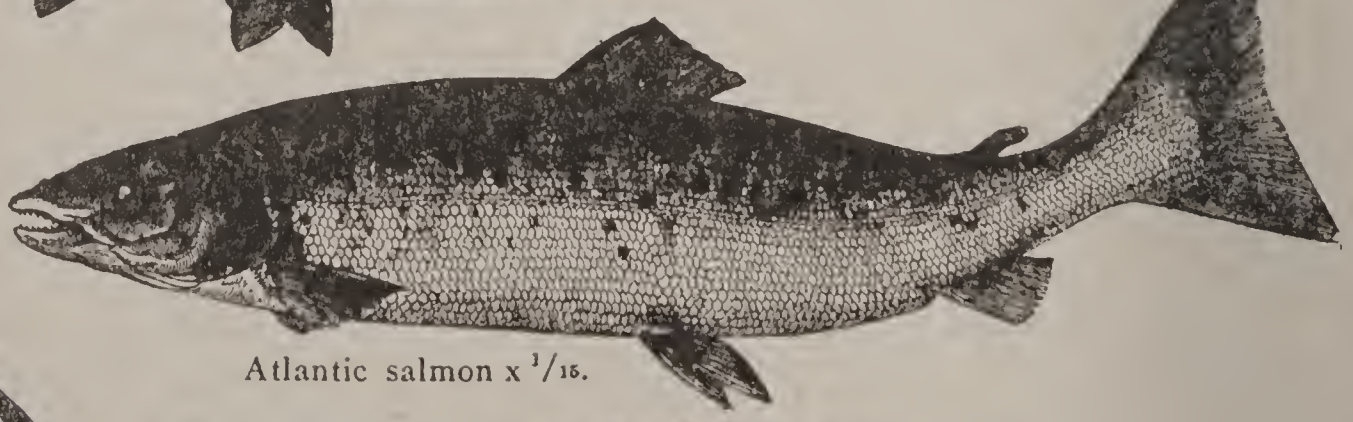
11

Brook trout x 1/6.

12

13

Young brook trout,
11. Just hatched x 8/1.
12. 1 month old x 6/1.
13. 6 weeks old x 1/2.



Atlantic salmon x 1/16.

Sturgeon x 1/16.

FOOD FISHES.

oxygen of the air, which is required for combustion. Theatrical scenery is fireproofed by treating the canvas with saline preparations similar to those used for cotton and linen, and fireproof paints may also be used. These paints are fairly successful in resisting fire, and usually contain sodium silicate and zinc chloride. Thick coatings of whitewash, with the addition of silicate of soda, are often used on walls and partitions for their fire-resisting value. In many places the drop curtain of a theater is required by law to be fireproof, and asbestos cloth is often used for this purpose. Paper can be made both fireproof and waterproof, from a pulp of vegetable fiber in which asbestos and saline salts of various kinds have been mixed in suitable proportions. In building construction, a fireproof structure is one in which there are no wood beams or lintels, while floors, stairs and roofs are constructed of approved noncombustible material. The extensive use of reinforced concrete, terra-cotta and firebrick in buildings has considerably lessened the fire risk, while steel furniture is now largely used in place of wooden desks, cabinets, lockers, and filing cases in office buildings to supplement fireproof construction.

Fireworks, a name applied to explosives and combustible materials used for entertainment. The basis of fireworks is much the same as that of gunpowder. The addition of copper sulphate produces a blue flame; strontium produces red; potassium, violet; sodium, yellow; barium, green; and iron filings, brilliant scintillations. These preparations are packed usually in paper cylinders,—a work requiring patience, skill, and extreme caution. They are set off by a fuse. The Chinese, inventors also of gunpowder, are credited with the invention of fireworks, but they were introduced into Europe at an early date. Henry VIII ordered a brilliant display on the occasion of his marriage with Anne Boleyn.

Pinwheels, rockets, giant crackers, and torpedoes to the value of $600,000 a year are made near New York City; but the old-fashioned firecrackers, without which the Fourth of July would be a failure, are made in China. They are done by hand.

While some of the cheaper varieties of fireworks, including the familiar bunches of firecrackers beloved of American youth, are imported from China, and many finer and more ingenious varieties come from Japan, the manufacture of fireworks has attained large proportions in the United States, where elaborate displays of the pyrotechnic art are frequently seen. The making of fireworks is called pyrotechny, from the Greek words for fire and art, and employed in 1920 American factories to the number of 57, with 1,222 wage-earners, capital of $3,546,943 and an annual product valued at $4,629,984. These factories make all the ordinary kinds of fireworks, including Roman candles, pinwheels, giant crackers, torpedoes, rockets, colored fire, etc., besides intricate and expensive "set pieces" for special occasions and formal exhibitions. These set pieces, composed of numerous kinds and colors of fireworks, may be made to represent portraits of popular individuals, naval and military battle scenes, buildings, or whatever the public fancy demands.

The chief materials used in making fireworks, besides gunpowder and its constituents, charcoal, sulphur and saltpetre, are metals and metallic salts which give a brilliant light when burning or will emit sparks of various shapes, singly or in showers; also touch paper and fuse or quick match to ignite the charges; paper and cardboard for cases and wood for sticks; and other substances with which to vary the effects produced by the fireworks when burning, including resin, camphor, soaps, gum and lampblack.

The process of making Roman candles is typical of firework construction. A number of stars or balls are made up of gunpowder ingredients mixed with materials that will give light or color when burning. They are firmly compacted by the aid of shellac or gum, and inclosed in a cardboard case, where they rest on loose layers of gunpowder, between firm masses of some slow-burning composition. The star balls are hollow, and each is furnished with a piece of quick match by which at

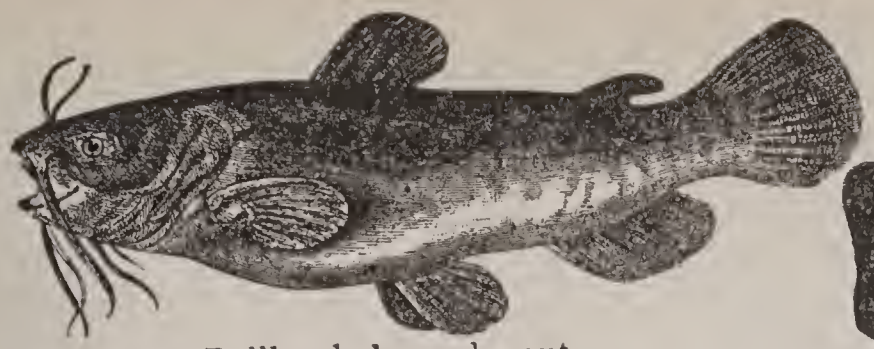
the proper time it is ignited. At one end of the case is a priming of powder and a cap of touch paper. When the firework is "set off" by a match or other flame the burning touch paper ignites the priming and this sets fire to the composition, technically called "dark fire." This, burning slowly, reaches one star after another, ignites the loose granulated powder on which it rests, and each star is expelled from the case with an explosive report.

The rocket is a form of firework that has many valuable uses. It may be used for signaling at sea, for throwing a light rope over a shipwrecked vessel from the land or another ship in rescue work, or for carrying explosive shells and incendiary substances into an enemy's terrain. The rocket commonly used in fireworks displays consists of a cylindrical cardboard body, called a fusee, which is filled with a composition having considerable propelling power. At the upper end a shorter but wider paper tube, called the pot, is attached; and this contains what pyrotechnists call the garniture, or the materials that produce showers of golden or varicolored rain, or clusters of brilliant stars, when the rocket has reached its greatest height. Flame passing through a hole in a clay plug at the top of the fusee sets the garniture alight at the proper time.

Colored fire is used for producing light and color in firework exhibitions, and also for distress signals at sea. It is made in various colors by adding metal filings and metallic salts of many kinds to gunpowder composition, and in this way beautiful and dazzling effects can be produced. It is a curious fact that lampblack produces a very red color when burned with gunpowder, and a pink when there is an excess of saltpetre; and it is also used for producing golden showers. An alkali derivative, the picrate of potassium, when burning, produces a whistling noise, and in recent years has been used by manufacturers of fireworks in making whistling rockets and bombs and various other novel devices.

Fire Worshippers, those who worship fire, especially the followers of Zoroaster in Persia and the Parsees in India. The ancient religion of Iran or Persia recognized a single god, a being who created and ruled the universe. Its followers venerated the sun as the emblem of deity, and fire as the representative of the sun on earth. A sacred fire was kept burning continually, watched and tended with incessant care lest it be extinguished. It is believed that the fire has burned for centuries and is still burning. This religion of ancient Persia was of a purer and higher type than that of other ancient nations. In the course of time it degenerated. Fire, which was but a symbol originally, came to be regarded as a deity in itself. The sun, moon, and stars were worshiped. Many strange beliefs were prevalent, and many strange rites instituted. Then Zoroaster claimed to have received direct revelations from Ormazd, the god of all good. The Zend-Avesta is a book containing his teachings, which are in large degree ennobling. The exact time of Zoroaster's life is unknown. Scholars place him from one to five centuries before Christ. In 641 A. D. Persia was conquered by the Caliph Omar and converted to Mohammedanism by the sword. A part of the followers of Zoroaster fled to India and there preserve their former faith. they are called Parsees. Others remained loyal at home in Persia. They have suffered persecution at the hands of the Mohammedans. They are called Guebres and are now allowed religious freedom. Together, the Guebres and the Parsees are estimated to number about 150,000. They are a highly respectable class, in many instances ranking among the wealthy and most intelligent citizens. They still regard fire as sacred; but scholars claim that, at least among the more intelligent, it is not worshiped, but regarded as an emblem of divinity. Among the more ignorant it is probably itself deified. See PARSEES; ZOROASTER; BOMBAY.

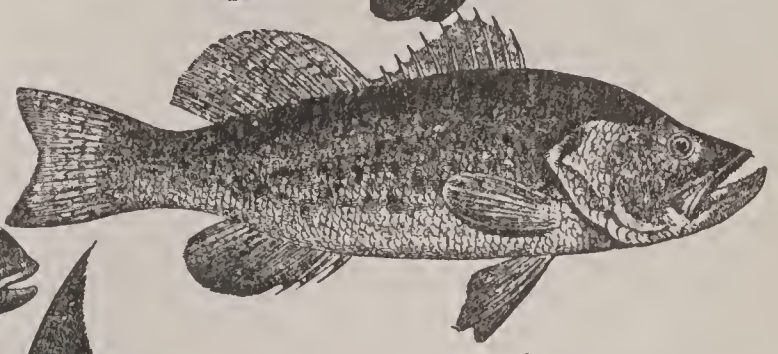
Fish, a vertebrate animal living in water only. In place of lungs a fish has delicate fringe-like gills in slits at the side of its neck. The blood courses through the gills as it does through ordinary lungs, and through the thin walls of the gills it absorbs the air that is mixed with the water.



Bullhead, horned pout.

Tench.

Perch.



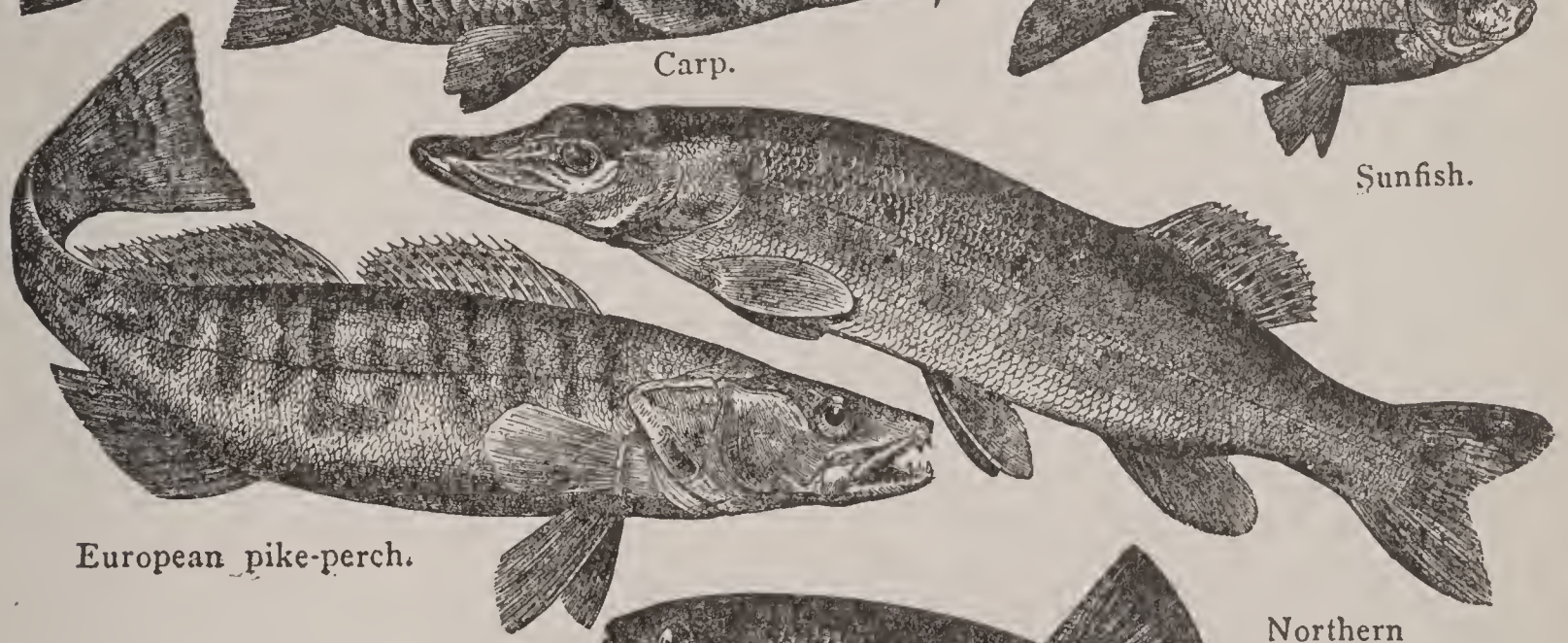
Large-mouthed black bass.

Whitefish.

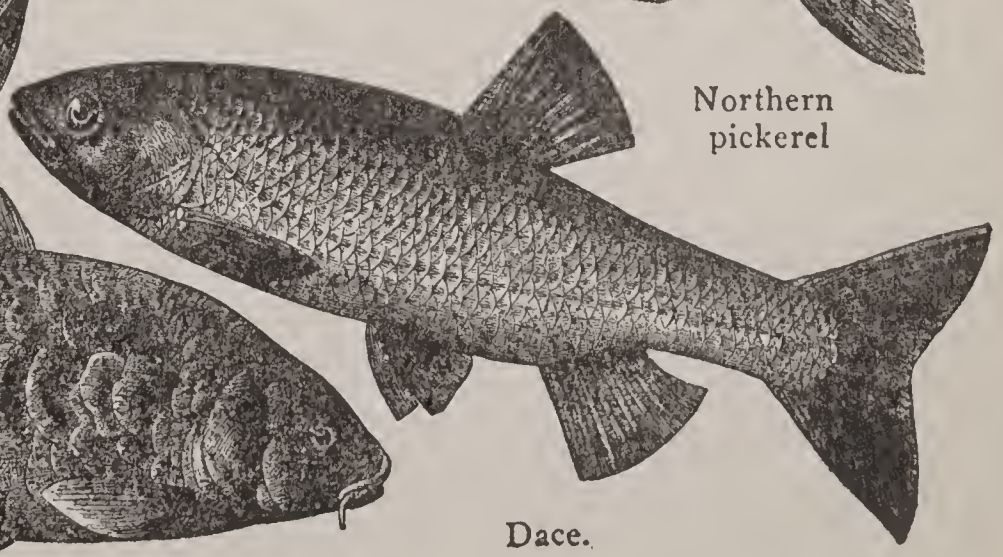
Roach.

Carp.

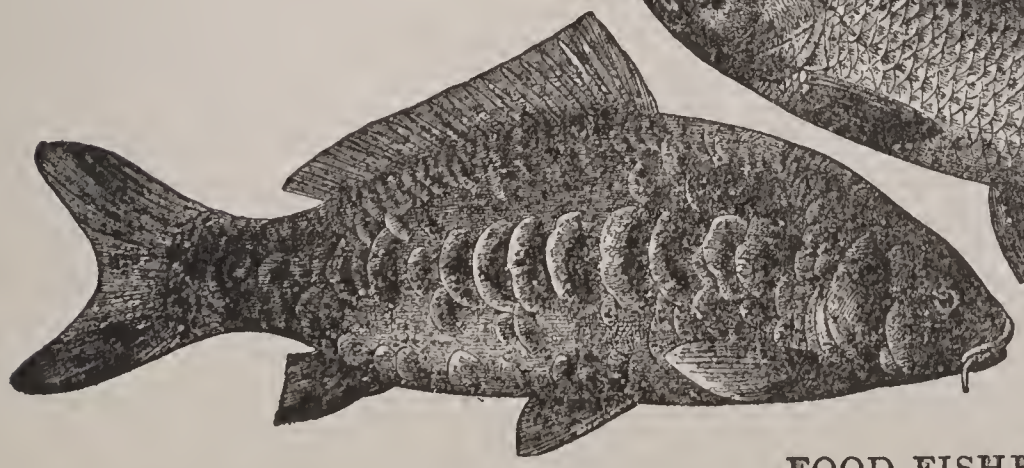
Sunfish.



European pike-perch.



Northern pickerel



Silver carp.

Dace.

FOOD FISHES.

Ordinarily a fish cannot live in air. Its gills dry up and, strange to say, the fish dies for want of air. An exception to this statement must be made in favor of one fish, the climbing perch of India, which is able, it is said, to carry water in cells with which to moisten its gills. It is able to leave its pond for two or three days, and is exhibited by the jugglers of India and China as a "fish out of water." Nor can a fish live without a constant supply of air. Unless the water is kept fresh, that is, supplied with pure air, a fish dies. Ponds are sometimes frozen over so closely that all the fishes die for want of air. Air holes in ice are frequently crowded by fishes struggling for water that has fresh air in it. Fishes take in water through the mouth and force it out through the gills. If a fish be held head down stream, or if in any way water be forced through the gills and out of its mouth, it will drown, just as a person would drown from too much water on the lungs. The heart of a fish has one auricle and one ventricle. The circulation of its blood is slow and the blood is cold.

The body of a fish is shaped for easy passage through the water. Boat builders have spent much time studying the form, "lines," of various fishes with a view to secure speedy models. The feet and tail of a fish are fitted for swimming. The front feet are converted into pectoral fins; the rear feet into ventral fins; the tail into a caudal fin; in addition to which a fish may have a dorsal or back fin or two, and an anal fin. A fin consists of a thin membrane spread on or supported by rays. The presence or absence, shape, and position of these fins is of service in the classification of fishes. The motion of a fish is derived chiefly from a flip of its tail; the dorsal and ventral fins serve to balance the body, and the front or pectoral fins are spread to arrest progress at any time. The scales are outgrowths of the skin and point backward. Each scale is to be regarded as a lock of hair imbedded in glue. Certain scales arranged in a line on each side of the fish are pierced with tubes through which a slimy matter oozes that serves to lubricate the body and make it slippery. The scales are exceedingly variable, and are another guide in classification. The catfish has no scales.

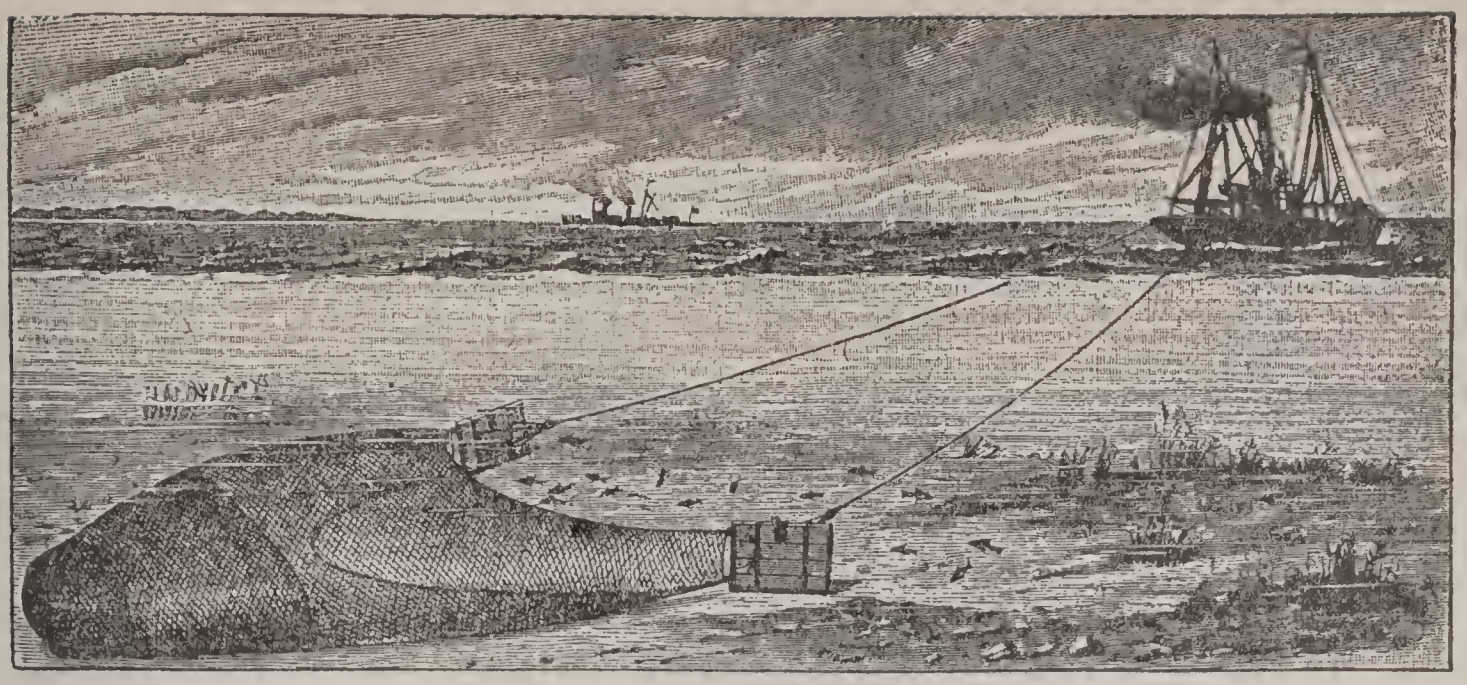
Fishes are supposed to see well for short distances, to hear tolerably well, and to have a fairly acute sense of smell. It is thought they have little sense of taste or little sense of touch, save in the feelers with which some fishes are provided. Most fishes are flesh eaters, preying on flies, water insects, crayfish, snails, frogs, and especially young fishes, or fishes smaller than themselves. Nature seems to have provided the small fishes for the benefit of the larger ones.

The catching of fish is an occupation employing a large number of persons. Fishes are taken with the hook, the spear, the trap, and with nets. Fishes furnish a considerable portion of the food of mankind, and are a source of wealth to many nations. Angling is one of the most delightful of diversions, even though Dr. Johnson did define an angler as "a pole and line with a fool at one end and a worm at the other."

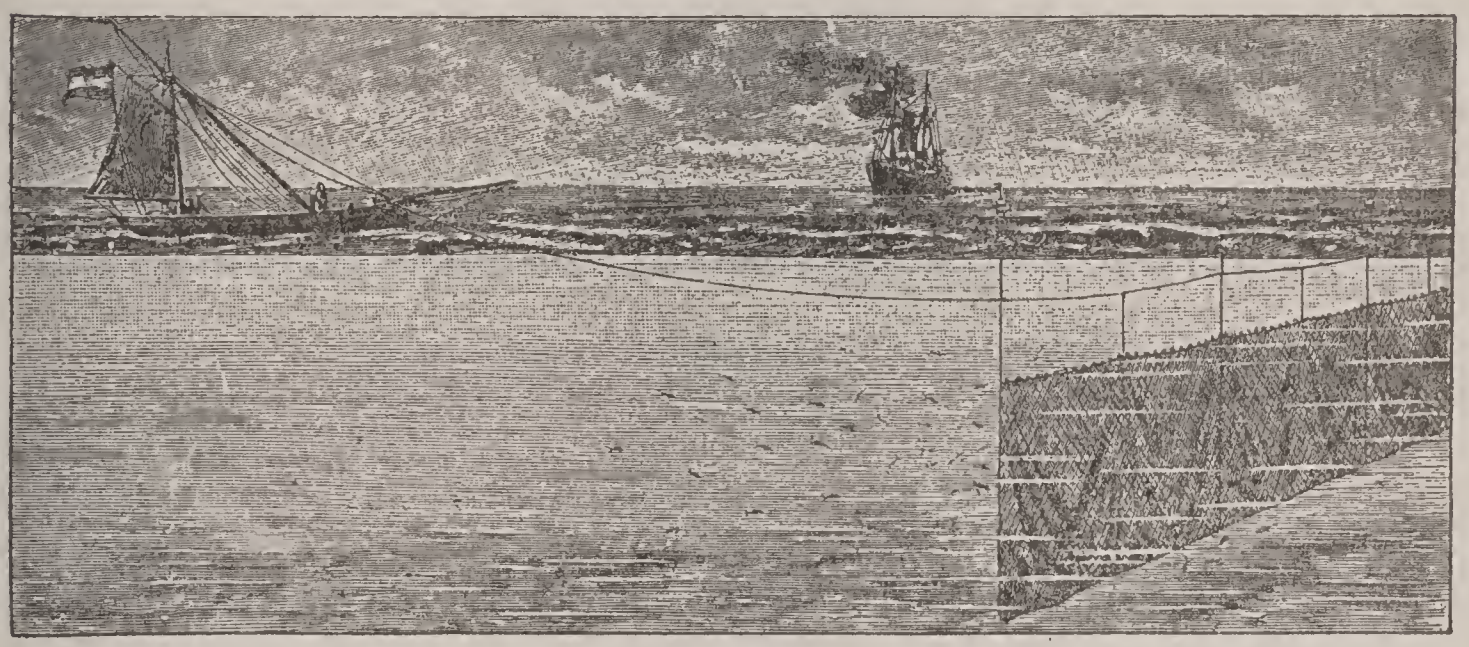
Recent authorities state that the number of different kinds of fishes in the world, not counting fossil species, is about 12,000. Of this total, there are 3,263 species in North America. The cod is the most valuable American fish. The salmon ranks next.

The fishes of North America may be placed in nineteen groups:

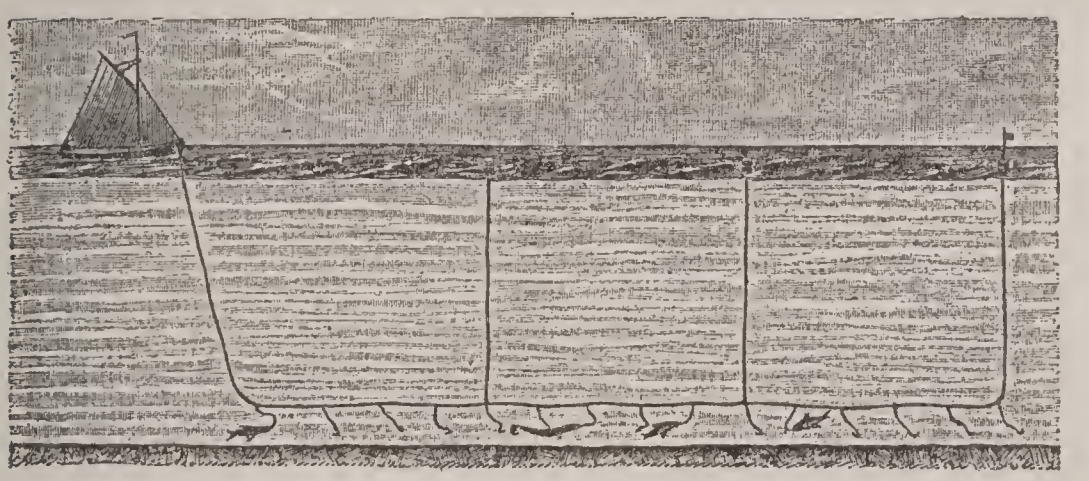
1. *The spiny-finned fishes,* including the bass, sunfish, perch, bluefish, mackerel, tuna, mullet, and swordfish.
2. *The pikes,* including the muskallunge and pickerel.
3. *The trout,* including the salmon, tarpon, shad, whitefish, and herring.
4. *The flying fishes.*
5. *The solid-jaw fishes.*
6. *The suckers,* including buffalo fish, carp, and minnows.
7. *The catfishes,* including the bullhead.
8. *The sticklebacks.*
9. *The common halibut.*
10. *The angler.*
11. *The eels.*
12. *The pipe-fishes.*
13. *The dogfish.*
14. *The gar-fishes.*
15. *The sturgeons.*
16. *The paddle-fish.*
17. *The chimeras.*



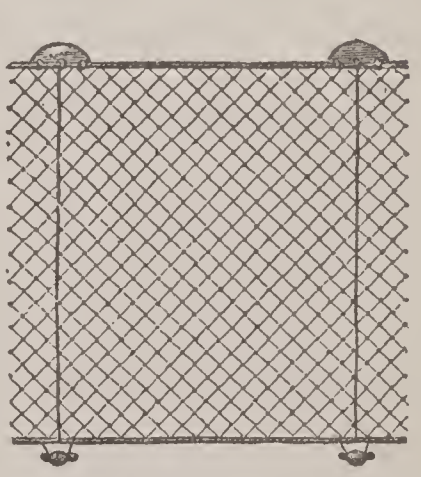
Fishing steamer and drag net.



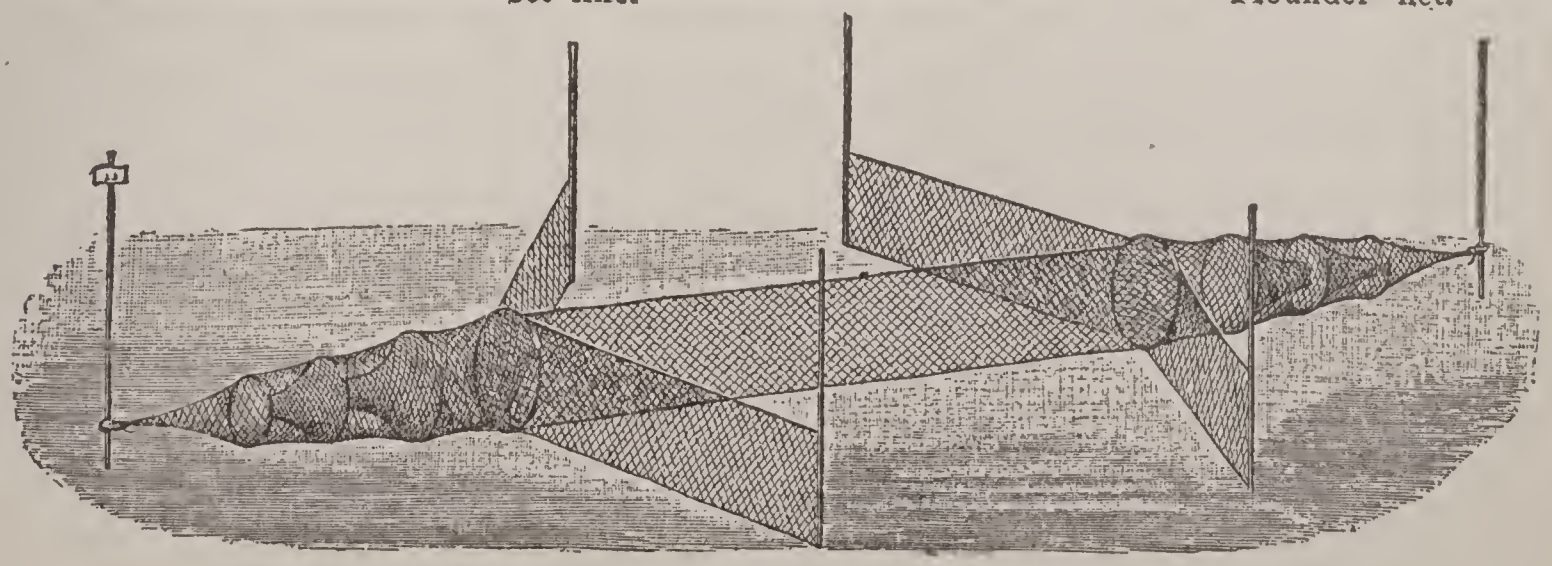
Drive net.



Set line.



Flounder net.



Eelbasket.

FISHING NETS.

18. *The sharks.*
19. *The rays.*

See FISHERY; also articles on the several fishes.

Fish-hawk. See HAWK.

Fisher, an animal of the marten family. It is a dark, glossy black, or brown animal, with occasional white and gray on head and under parts. The body is about twenty-three inches in length; tail, fourteen. It is an animal of the forests,—a bold, active tree-climber, to be found from the Adirondacks westward to the Pacific coast. It is quick as a mink, and as greedy as a wolverine. Trappers dread the fisher for its adroitness in stealing bait. The animal is capable of following a trail for miles, springing the traps, and stealing the bait. It lives on fish, rabbits, squirrels, chipmunks, grouse, small birds, snakes, toads, frogs—any meat, dead or alive. The pelt of the fisher is worth about six dollars in the North American markets. See FUR.

Fisher, Harrison (1875—), an American artist who is best known as an illustrator, though he also paints portraits and makes etchings. He was born at Brooklyn, N. Y., and studied at the Mark Hopkins Institute of Art, San Francisco. Mr. Fisher has drawn more than a thousand studies of American girl types. He has illustrated a number of books, and his illustrations of short stories in such American magazines as *Cosmopolitan, Life, Ladies Home Journal,* and others, are well known. Mr. Fisher is a faithful character delineator and a master of technique. He was a master of details.

Fisher, Sydney Arthur (1850-1921), a Canadian statesman, was born at Montreal and educated at McGill University and at Trinity College, Cambridge, specializing in scientific agriculture. Elected to the Dominion House of Commons in 1882, Mr. Fisher served continuously and very creditably until 1912. In 1896 he became a member of the Cabinet with the portfolio of Agriculture under Sir Wilfrid Laurier. Mr. Fisher did a great service to the Dominion by establishing agricultural experiment stations and extending the Experimental Farm System; and was also successful in securing the removal of United States quarantine restrictions on Canadian cattle. After retiring from the government he was chosen director of the Brome Agricultural Society and chairman of the Canadian Delegation to the North American Conference on the Conservation of Natural Resources. He received the degree of Doctor of Laws (LLD) from McGill University in 1920. He was a politician respected by both associate and opponent. By his will, a substantial sum of money is set aside, the annual income of which is to be devoted to the encouragement of education and scientific agriculture in the county of Brown, Quebec.

Fisheries Question, in American history, the right, or otherwise, of American fishermen to take fish in Canadian waters. Prior to the American Revolution there was no such question, all British waters being open to all colonists.

The Canadian fisheries were, and are, by far the most valuable on the North American coast. In negotiating the Peace of Paris, 1783, Great Britain very naturally desired to cut the late colonists out of fishing in the Canadian waters; but John Adams, one of the United States commissioners, being a native of New England, and familiar with the value of the Canadian fisheries, stood stoutly for fishing privileges. To understand the question, it is needful to know that the sea, to within three miles of the shore, is everywhere open in time of peace to all comers. The right of fishing is nowhere disputed. A Norwegian ship may fish three miles off shore from Naples; but it is useless to catch fish, unless the fishermen have the privilege of landing and curing their catch. The fishing question is then a question largely of shore privileges, and one not fully settled as late as 1923.

Adams secured valuable privileges, as stated, in 1783. In 1818 a treaty was made with Great Britain by which three privileges were granted American fishermen:

1. To take fish in shore, that is to say, inside the three mile limit on parts of the coast of Newfoundland and Nova Scotia.

2. To dry and cure fish on unsettled parts of these coasts.

3. To enter harbors of settled coasts fod wood, water, and shelter.

The most difficult point in question was what constituted the deep sea. Canada claimed that the three mile line should be carried from headland to headland. This would shut the New England fisherman out of the Bay of Fundy and the Gulf of Saint Lawrence. In 1910 the question was submitted to the Hague Tribunal. Following this movement a joint commission, consisting of members from Canada, Great Britain and the United States arrived at a satisfactory solution of the problem and removed the vexing question from American and British diplomacy.

Fishery, the taking and curing of any sort of water animal for the market. In the widest sense of the term the fisheries of the world include whaling, sealing, catching sea otter, the taking of turtles, alligators, fishing for oysters, clams, crabs, shrimps, lobsters, the gathering of sponges, corals, and pearls, as well as catching the various food fishes. The fisheries of the world produce about $300,000,000 worth annually. In order of importance the leading fisheries are those of the oyster, herring, salmon, and cod. Named in the order of the importance of their fisheries, the leading countries are the United States, Great Britain, Japan, Russia, France, Canada, Norway, and Newfoundland. In the United States there are about 232,000 people engaged in various fisheries. The total annual catch is worth about $60,000,000. For further information the reader is referred to the articles on the various fishes, the shellfish, and other water-animals of pursuit. Fishermen are wont to claim that the sea, including lakes and rivers, yields more food than the land; this statement was at one time true.

All countries having valuable fisheries systematically carry on fish culture. The United States Fish Commission and the fish commissions of the various states maintain hatcheries and stock the lakes and streams with fry. They also regulate the seasons for fishing and the methods of fishing on inland waters. The United States, Great Britain and Canada, in the order named, are the leading countries in production of fish.

See Cod; Herring; Mackerel; Salmon; Sardines; Oyster; Clam.

Fiske, John (1842-1901), an American historian. He was born at Hartford, Connecticut, and died at Gloucester, Massachusetts. He was graduated at Harvard in 1863, and a year later he was admitted to the bar, but he had no desire to practice. During his sophomore year he attracted attention by a paper in the *National Quarterly Review,* entitled "Mr. Buckle's Fallacies." It was a critical review of Buckle's *History of Civilization in England.* For about ten years, from 1869 to 1879, Mr. Fiske held a position in Harvard University as a lecturer on philosophy, and as an assistant librarian. During this period he published *Outlines of Cosmic Philosophy* and read incessantly. In 1884 he was made professor of American history in Washington University at St. Louis, a position which he held for some years. Mr. Fiske's later years were filled by writing and lecturing. He went abroad, giving among others a course of lectures on American history at the University of London.

Mr. Fiske's chief philosophical works are: *Myths and Myth Makers, Outlines of Cosmic Philosophy, Idea of God,* and *Origin of Evil, Excursions of an Evolutionist,* and *The Destiny of Man.* Named in the order in which they appeared, his chief historical works are: *The Critical Period of American History, The War of Independence, The Beginnings of New England, The American Revolution, Old Virginia and Her Neighbors, The Dutch and Quaker Colonies, New France and New England.* Taken in chronological order, they form a history of the United States from the discovery of America to the adoption of the Constitution.

Mr. Fiske died before he finished writing, but he left a monumental amount of work. As a historian, he belongs to the older literary type rather than the modern scientific; but he has done invaluable service in popularizing the results of other men's reasearch.

See Bancroft; Prescott.

Fiske, Minnie Maddern (1865-), an American actress who has achieved much success in the leading roles of Ibsen's dramas. She was born in New Orleans, La. Her parents were theatrical, and at the age of 3 she was playing child parts. At 15 she was a star. In 1890 she married Harrison Grey Fiske. Madame Fiske, after a brief retirement from the stage, appeared in 1893 in *Hester Crewe*, a play written by her husband. She is identified especially with Ibsen's *A Doll's House,* with *Tess of the D'Urbervilles,* adapted from Thomas Hardy's novel of that name, and with *Becky Sharp*, founded on Thackeray's *Vanity Fair.* Madame Fiske displays a keen intelligence and a fine sense of dramatic values in all her work. She has appeared in moving pictures.

Fitch, Clyde (William) (1865-1909), an American playwright and author, was born in New York City. He was graduated from Amherst College in 1886, and his first play, *Beau Brummel*, was produced by Richard Mansfield in 1890. This was followed by a number of adaptions from the French and the German, and by a host of original pieces. Often his work suffered from haste and carelessness, yet his was the first American name of an importance sufficient to attract people to the theatre. The best known plays by Mr. Fitch are *Nathan Hale, The Climbers, The Girl with the Green Eyes, The Woman In the Case, The Truth, The Straight Road* and *The Moth and The Flame.*

Fitch, John (1743-1798), an American inventor. He was born at Windsor, Connecticut, and died at Bardstown, Kentucky. He was a blacksmith in the Revolutionary army, passing the winter with Washington at Valley Forge. After the return of peace he traveled among the Indians of Pennsylvania, trading for furs. He was taken captive and had a hard time generally. In 1785 he constructed a model of a steamboat, and in 1787 he made a trip on the Delaware at Philadelphia with a forty-five foot steam-propelled boat. During the summer of 1790 a passenger boat ran regularly from Philadelphia to Burlington, twenty miles, but attracted little attention. In 1793 he went to France, but fell on the evil days of the French Revolution. He worked his way back to America in utter destitution and dejection. Whether his invention was a little early or a little crude, or whether he lacked the ability of inspiring enthusiasm in others, it is certain that Fitch was a most unfortunate man. He was a man of mechanical genius, yet he was reduced to beggary. The story of his appeals for financial assistance is a pitiful one. He took his own life in despair, leaving Robert Fulton to reap where he had sown.

Fitchburg, a manufacturing city of Massachusetts, is on the New York, New Haven & Hartford and the Fitchburg (Boston & Maine) railroads, 50 miles northwest of Boston. The Fitchburg State Normal School is situated here. The city has a good public school system, a large modern hospital, a public library, banks, and daily and weekly newspapers.

Fitchburg's industries are many and varied. There are manufactories of pianos, machinery, tools, saws, paper, electrical appliances, axle grease, and sundry steel and iron products. There are also granite quarries and brick yards, and cotton and woolen mills. Population 41,029.

Fitzgerald, Edward (1809-1883), an English poet and translator. He was born near Woodbridge, Suffolk. His education was received at Cambridge. While at college he formed a life-long friendship with Thackeray. Later friends were Carlyle, Tennyson, and George Crabbe, son of the poet of that name. It is interesting to note that, while Fitzgerald and Tennyson were close friends, Fitzgerald was exceedingly frank in his criticisms of Tennyson's poems. For the most part he did not like them as well as might have been expected. Crabbe was Fitzgerald's favorite poet. Fitzgerald passed the retired and uneventful life of a student and man of letters. His recreations were boating and gardening. His writings include *Euphranor, a Dialogue on Youth, Polonius, a Collection of Wise Saws and Modern Instances, Six Dramas of Calderon,* translations from Aeschylus and Sophocles, and his most

celebrated work, *The Rubáiyát of Omar Khayyám.* Omar Khayyam (ō′mär khiyäm′) was a Persian poet and astronomer who died early in the twelfth century. The word Rubáiyát signifies quatrains or four line stanzas. *The Rubáiyát* is the best known example of Persian literature. A few stanzas of the poem will give an idea of the style:

Whether at Naishapur or Babylon,
Whether the Cup with sweet or bitter run,
The Wine of Life keeps oozing drop by drop,
The Leaves of Life keep falling one by one.

. . .

Ah, my Beloved, fill the cup that clears
Today of past Regret and future Fears:
Tomorrow!—Why, Tomorrow I may be
Myself with Yesterday's Sev'n Thousand Years.

. . .

There was the Door to which I found no Key;
There was the Veil through which I might not see:
Some little talk awhile of Me and Thee
There was,—and then no more of Thee and Me.

. . .

I sent my Soul through the Invisible,
Some letter of that After-life to spell:
And by and by my Soul return'd to me,
And answer'd, "I Myself am Heav'n and Hell."

The Moving Finger writes; and, having writ,
Moves on: nor all your Piety nor Wit
Shall lure it back to cancel half a Line,
Nor all your Tears wash out a Word of it.

Lowell wrote a poem, *In a Copy of Omar Khayyám,* the first stanza running:

These pearls of thought in Persian gulfs were bred,
Each softly lucent as a rounded moon;
The diver Omar plucked them from their bed,
Fitzgerald strung them on an English thread.

See OMAR KHAYYAM.

Five Nations. See INDIANS.

Fitzpatrick, Sir Charles (1853-), an eminent Canadian jurist, Chief Justice of Canada and Deputy Governor-General during 1906-18. He was born in Quebec, was graduated from Laval University in 1873, and was called to the bar in 1876. From 1879 to 1887 Sir Charles was Crown Prosecutor for the city and district of Quebec. In 1885 he was chief counsel for Louis Riel, who was tried and executed for high treason. Sir Charles was a member of the Quebec Assembly during 1890-96, was elected to the Dominion Parliament in 1896, and was Solicitor-General in 1896-1902. After serving as Minister of Justice for four years, Sir Charles was appointed Chief Justice of Canada. He was a member of the International Arbitration Court at The Hague in 1910. Resigning as Chief Justice in 1918, he was appointed Lieutenant-Governor of Quebec.

Fiume, an independent state situated at the head of the Qarnero, an arm of the Adriatic Sea. It has an area of eight square miles and a population of about 50,000. This state was created by the Treaty of Rapallo between Italy and Jugoslavia, signed Nov. 12, 1920, and ratified in February 1921. At the Peace Conference at Versailles Jugoslavia wanted her boundaries extended to include Fiume and adjoining territories on the Quarnero —Italy objected and her objections were sustained by Britain and France, because in the Pact of London, 1915, these countries and Russia had promised Italy a large extension of territory in southeastern Europe, as an inducement for her to enter the World War on the side of the Allies. While negotiations were pending Gabriel D'Annunzio with a small company of Italian troops seized Fiume and held it for Italy without the knowledge or sanction of the Italian government. Jugoslavia is now assured of an outlet to the sea through the ports of Fiume and Barros. See D'ANNUNZIO.

Fixed Stars, the name arbitrarily applied to those stars which, though in motion, maintain a fixity relatively to each other and to the earth that planets do not maintain. The name is applied to all stars except planets and their satellites, comets and asteroids. The motion of fixed stars is exceedingly rapid, but their distances from the earth prevent, in most cases, a determination of their actual speed, motion and direction even with the aid of powerful astronomical instruments.

Fjord. See NORWAY.

Flag, American. The early flags of the American colonies were, of course, the flags of the mother country. Various colonies had a local device. Massachusetts, for example, placed a pine tree on her flag. No general desire to change the British flag appeared until immediately preceding

the American Revolution. In 1775 an American flag was adopted by Congress, combining the cross of St. George and that of St. Andrew with thirteen stripes, alternate red and white. The cross of St. Patrick did not appear in this flag because it did not appear in the British flag until 1801, the year of the union with Ireland.

In his defense of Fort Jackson Colonel Moultrie hung out a large blue flag with a crescent in one corner. During the summer of 1775 a signal was devised for American cruisers. It was a white flag with a pine tree in the center. February, 1776, Colonel Jackson presented Congress an elegant standard for the use of the commander-in-chief of the American navy. This was a yellow flag with a lively rattlesnake in the middle in the attitude of striking, and the words underneath, "Don't tread on me." Various flags were used by the colonials at the battle of Bunker Hill. June 14, 1777, Congress resolved "That the flag of the United States be thirteen stripes, alternately red and white; that the union be thirteen stars, white in a blue field, representing a new constellation." The blue field was taken from the Covenanters' banner of Scotland, being likewise significant of the covenant into which the colonies entered against oppression. The stars were disposed in a circle, symbolizing perpetuity of union, the circle being the sign of eternity. The thirteen stripes showed, with the stars, the number of united colonies. The whole was a blending of various flags used previously.

The size of the flag of the American army is 4 feet 6 inches in length, and 4 feet 4 inches in width, with 7 red stripes and 6 white ones. The first 7 stripes, 4 red and 3 white, bound the square of the blue field for the stars. With the admission of Vermont and Kentucky Congress added two stripes and two stars, and this was the flag during the War of 1812. On the 4th of April, 1818, Congress directed a return to thirteen stripes as follows:

> Be it enacted, etc., That from and after the 4th day of July next the flag of the United States be thirteen horizontal stripes, alternate red and white; that the union be twenty stars, white, in a blue field.
>
> And be it further enacted, That on the admission of a new State into the Union, one star be added to the union of the flag; and that such addition shall take effect on the 4th of July next succeeding such admission.

The first official flag of the United States was constructed at the home of Mrs. Ross, a dressmaker, in Philadelphia, under the direction of Gen. Washington and a congressional committee appointed for the purpose. The committee was for stars of six points, but Mrs. Ross suggested that the stars would be more pleasing to the eye if made with five points. Her suggestion was adopted. It is interesting to know that Mrs. Ross pleased the committee so well that she was solicited to undertake the manufacture of flags for the government, a business which descended to her children. The Old Flag House, as her home was called, stands in Arch Street. It has been converted into a flag museum.

The United States navy department maintains a flag factory at the navy yard of Brooklyn. About 50,000 flags are made yearly, including some 300 patterns —domestic and foreign. The largest flag is ensign No. 1. It is 36 feet long and 19 wide. It costs $40. The president's flag is embroidered with silk worth $9 a pound. In order to be equipped to show proper courtesy to foreign ships, an American battle-ship carries forty-three different foreign flags, all made in this factory. It costs $38 to make the white elephant flag of Siam, and $51.75 to make the dragon flag of China. A full equipment of flags, ensigns, and signals includes 250 separate flags. A set is worth $2,500, and is supposed to be renewed each three years. The factory is fitted up with machinery. Including material and wages the factory costs our government $60,000 a year.

The thirteen stripes are named for the thirteen original colonies in the order in which they ratified the Constitution. Named from the top, they are Delaware, Pennsylvania, New Jersey, Georgia, Connecticut, Massachusetts, Maryland, South Carolina, New Hampshire, Virginia, New York, North Carolina, and Rhode Island. The star representing a state may be found by counting. The first star in the upper left hand corner, where one would begin

to read, shines for Delaware. The fourteenth star by count represents Vermont; the thirty-ninth, following line by line, as one would read, belongs to North Dakota. The last stars, the forty-seventh and forty-eighth, are those of New Mexico and Arizona.

A few other terms should be remembered. To strike the flag is to haul it down in token of surrender; to dip is to lower slightly and run up again in honor of a passing ship or dignitary; to display at half mast is to run the flag half way up the flag pole and leave it there as a sign of mourning. By usage, a white flag signifies surrender and is also the flag of truce; a red flag, mutiny; a black flag, piracy; and a yellow flag, quarantine.

See TRICOLOR; UNION JACK; CRESCENT.

FLAGS OF OTHER COUNTRIES.

The flags of other nations are given below. While many of these countries have special flags for their navies and rulers, the national flag only is given.

AUSTRALIA. A blue field with five white stars, with the Union Jack in the upper corner next to the mast.

AUSTRIA. Two horizontal red stripes and one horizontal white stripe in the center.

BELGIUM. Three vertical stripes, black, yellow and red.

BRAZIL. Green field, with yellow square having a blue circle with stars.

CANADA. The Union Jack is flown from all fortresses and garrisons under military supervision, but Canada's national flag is displayed on public occasions. This is a red field with the Union Jack in the upper corner next to the mast, and the Dominion coat of arms in the field.

CHINA. Five horizontal bands, red, yellow, blue, white and black.

CZECHO-SLOVAKIA. White, red and blue.

DENMARK. A red field with a white cross.

ESTHONIA. Blue and black horizontal stripes.

FINLAND. White field, with a blue cross.

FRANCE. A combination of blue and red, the colors of the city of Paris, with the while of the royal house of Bourbon.

GERMANY. Three horizontal stripes, black, red and gold.

GREAT BRITAIN. A red field, with the blue and white Union Jack in the upper corner next to the mast.

HOLLAND. Three horizontal stripes, red, white and blue.

HUNGARY. Red, white and green.

ITALY. Vertical bars of green, white and red, with blue-red figure on white stripe.

JAPAN. A red disk on a white field.

JUGO-SLAVIA. Red, blue and white. .

MEXICO. Three vertical stripes, red, white and green.

NORWAY. A red field with a blue and white cross.

POLAND. White and red.

RUSSIA. Red.

SPAIN. Yellow and red.

SWEDEN. A blue field with a yellow cross.

SWITZERLAND. A red field with a white cross.

Flag, a plant. See IRIS; SWEET FLAG.

Flagg, James Montgomery (1877-), a noted American illustrator and author, a worker in charcoal, pen and ink, water color and oils. He was born at Pelham Manor, N. Y., and studied art in New York, England and Paris. He produced acceptable work at the age of 14, and in a few years was in command of a substantial income. Mr. Flagg's illustrations have appeared in many American magazines, and he has illustrated several novels. He has painted portraits in water colors and in oils. He is the author of a number of popular novels, including the *Yankee Girls* series; *The Mystery of the Hated Man, If—A Guide to Bad Manners, All In the Same Boat, The Adventure of Kitty Cobb,* and others. He designed about 50 war posters during the World War.

Flagg is very versatile in whatever medium he employs, his work in charcoal, crayon, pen and ink, as well as oil, being unusually well done. One of his best portraits is that of Mark Twain, which is in the Lotus Club, New York.

Flamingo, a family of wading birds allied to the stork, the ibis, and the curlew. The legs are long and stilt-like. The feet are completely webbed. There are eight species, all tropical. Our species, forty-five inches in height, has rosy, vermillion plumage and black wing coverts. It is resident in tropical and subtropical America. It is found at times near Cape Sable, Florida, and occasionally along the Gulf as far as Texas. The flamingo has a long curved beak of such a shape that, when its head is down and the bill in the mud, the point is turned backward and upward under the neck. The bird wades in the water and feeds on the bottom. The sides of the bill are provided with "strainers," like those of the shoveler duck, through which water and mud are forced while snails and small shellfish are retained. Flamingoes frequent the mud flats of the seashore and the inland waters of Cuba, the Bahamas, and South America. They breed in colonies. Mr. Frank M. Chapman speaks of 2,000 mud nests on a level mud flat near a shallow lagoon on one of the Bahama Islands. In nesting the flamingo heaps up a cone of mud and muck ten or twenty inches high. It deposits its two whitish eggs in a hollow at the top. Despite the repeated assertions to the effect that the bird straddles this cone in hatching, it folds its long legs bird-fashion, like any other self-respecting wader.

Flammarion, flȧ-mȧ-re-ôn′, **Camille** (1842-1911), a French astronomer and writer on popular scientific subjects. He was born at Montigny-le-Roi. He studied theology for a time, but when only sixteen entered the imperial observatory. His first work to attract attention was as editor of *Cosmos,* a popular scientific magazine. He delivered popular lectures on astronomy and later became an advocate of spiritualism. In pursuing his studies of the atmosphere M. Flammarion has made many balloon ascensions. His most popular books have been translated into English; some of them are *The Plurality of Inhabited Worlds, God in Nature, Urania, The Stars and the Curiosities of the Heavens, Popular Astronomy* and *The Unknown and Psychic Problems.* He has been an active member of The Society for Psychical Research.

Flanders, an ancient countship of the Low Countries. In rank it corresponded to a modern duchy. It lay along the southeastern shore of Dover Strait, and was, accordingly, the portion of the continent nearest England. Its boundaries were never very definite. It came into notice about the time of Charlemagne. As Henry may be said to be the favorite name of the Kings of England, and Louis that of the French kings, so Baldwin is the common name of the counts of Flanders. There were at least nine counts of the name. Baldwin IX took a prominent part in the Crusades, and in 1204 was made the first Latin emperor of Constantinople. Flanders was a traditional outlet for the unruly and adventurous spirits of Great Britain. Guy Fawkes, the tool of the Gunpowder plotters, saw service in Flanders. The low villain on the English stage, especially if a soldier, was represented traditionally as recently returned from Flanders. In 1369 the countship passed by marriage into the family of the Duke of Burgundy. Flanders later passed into the possession of the house of Austria. In 1648 its partition began. Part now belongs to France, East and West Flanders are counties of Belgium, and still another portion, the northern, is a part of the Netherlands. During the Middle Ages Ghent and other Flemish cities were of no small importance as weaving, commercial. and art centers. Flemish weavers taught the English the art of weaving woolens. Flemish language is an early form of the Dutch, bearing much the same relation to that language that Lowland Scotch bears to modern English.

Flannel, a light, loosely woven woolen fabric used for undergarments, bed coverings, infants' clothing, and for men's light coats and women's gowns. Flannel was first produced in Wales, the name flannel being derived from a Welsh word signifying woolen. For hundreds of years no other textile was manufactured in Wales, but so much commercial importance was attached to the production of flannel that annual fairs were held to display and sell flannel alone. At the present day such

a variety of fabrics is included under the term flannel that the word can scarcely be said to have a specific meaning. In general, the term conveys the idea of a light weight, comparatively coarse fabric of lusterless surface. It may be woolen, cotton, or a mixture. The name flannel is used in connection with other terms to designate a variety of fabrics, the more important of which follow:

1. *Domestic flannel* is the original flannel. It is of wool, plain or twilled, usually finished with a short nap. It possesses considerable elasticity and is used for underwear, petticoats, boys' shirts and blouses, lining and interlining for heavy overcoats, and for a variety of domestic purposes.

2. *Baby flannel* is of wool, wool and cotton, wool and linen, wool and silk. It is very light weight, fine, soft, smooth finish, bleached, or unbleached. As the name implies, its chief use is for infants' clothing.

3. *Opera flannel* is a light weight, fine, soft flannel, with an extra smooth finish, and dyed in fancy colors. It is used for infants' cloaks, women's sacques and house gowns, and for fancy work.

4. *Flannel Sheeting* is a very wide white flannel used for bed sheets. The difference between this fabric and wool blankets is one of weight and length of nap.

5. *Dress flannel* is an all wool textile made in a variety of weights, colors, and styles of finish. It is used for women's suits and dresses.

6. *French flannel* is a specially fine, soft, twilled variety, dyed in plain colors or printed like calico. It is used for waists, wrappers, dressing sacques, etc.

7. *Navy twilled flannel* is a fairly heavy, twilled, all wool flannel dyed navy blue. It is used largely for men's and boys' winter shirts.

8. *Clothing flannel* is a fine, nicely finished, all wool grade of men's suiting. The uniform of members of the Grand Army of the Republic is made from this flannel.

9. *Shaker flannel* is a white flannel made with cotton warp and woolen weft. It is used as a substitute for all wool flannel and for domestic purposes. Many flannels contain a small proportion of cotton, which lessens shrinkage.

See OUTING CLOTH; CANTON FLANNEL.

Flathead, or Salish, Indians, a tribe inhabiting a region in the vicinity of Flathead Lake, Montana. Their name came from the fact that it was their custom to flatten the heads of their infants by artificial means. This custom has now fallen into disuse, however. The Flathead Indians are short of stature and badly formed, with wide mouth, thick nose and lips and large nostrils. Their tents were made of buffalo skins when on the hunt, but otherwise they lived in huts covered with bark. They are now confined to a reservation in western Montana. Their number is gradually diminishing.

Flax, a well known plant cultivated for its fiber and seed. The botanical name is *linum,* the first syllable of which appears in linen, linseed, lining, line, linsey, and lint. The Scotch speak of lint in the bell, when we say flax in blossom. The flower is regular, and delicate of color, giving rise to the expression, "eyes as blue as flax." The color of the ripened straw is a light yellow, however, as may be implied from "flaxen-haired." The origin of flax is not known, but it has been in cultivation, especially in the countries of Europe, since the dawn of history. The inner bark yields the celebrated fiber from which linen cloth and thread, cambric, linen-lawn, and lace are made. Ireland is celebrated for its linen industry, the moist, mild climate of that country seeming to produce flax fiber of the finest quality. Flax is an annual, sowed broadcast every spring. It matures in about seventy days. The methods of harvesting, retting, and breaking, are similar to those employed for hemp. In America flax is raised chiefly for its seed. Ground flaxseed yields linseed oil and oil cake. The former is used in the preparation of paints; the latter is fed with excellent results to stock. Flaxseed is thirty-eight per cent fat. A bushel of seed yields nineteen pounds of oil. The world's annual production of flaxseed is about 100,000,000 bushels.

The production of flaxseed in the principal producing countries in 1920 was as follows:

	Bushels.
United States	10,774,000
Canada	7,998,000
Argentina	42,038,000
Uruguay	932,000
Austria	38,000
Belgium	862,000
Czecho-Slovakia	313,000
France	446,000
Italy	386,000
Netherlands	610,000
Rumania	139,000
Spain	52,000
British India	16,760,000

In the United States the acreage sown to flax and total production of flaxseed in 1920, by states, was as follows:

	Acres	Bushels
Wisconsin	6,000	63,000
Minnesota	287,000	2,726,000
Iowa	11,000	96,000
N. Dakota	396,000	2,534,000
S. Dakota	216,000	1,404,000
Nebraska	3,000	24,000
Kansas	20,000	134,000
Montana	225,000	1,125,000
Wyoming	1,000	6,000

The total value of the flaxseed crop in the United States in 1920 was $11,732,000. In 1922 the United States exported 469,397,376 pounds of linseed cake, a flaxseed product, having a value of nearly $10,500,000.

Linseed oil, an important product of flaxseed, possesses the power of absorbing oxygen to a greater degree than any other oil. Its name is derived from the "line" or fiber of the flax stalk. When flax plants are raised for their fiber, they are pulled before the seeds are ripe. In that case the seeds must be allowed to age for several months before pressing for their oil, and then the quality of the oil obtained is not nearly as good as that from ripe seed. The oil may be separated from the seed after crushing, either by subjecting the heated meal to hydraulic pressure or by a continuous process in which the crushed seeds are fed in at one end of a machine and the pressed meal comes out at the other end. It may also be extracted by a naphtha process, which is not much used. The oil is allowed to stand from four to six months to remove impurities, the clear layer of oil resulting being raw linseed oil. Its drying qualities are improved by heating the raw oil with small amounts of lead and manganese compounds. When thus treated the so-called boiled oil will dry in from 8 to 24 hours, while the raw oil requires 72 hours. Besides its importance in the paint industry, linseed oil has many other uses, as in the manufacture of linoleum, patent leathers, and lithographic inks, and other articles. See LINEN; HEMP; PAINT.

Flaxman, John (1755-1826), an English sculptor. He was born at York and died at London. Flaxman assisted his father in the manufacture of plaster casts and images for sale in a shop in Covent Garden. He learned to read Greek and Latin out of a desire to read up on the figures he was making. At fifteen years of age he won attention from the Royal Academy by exhibiting a wax model of Neptune. He then went to Italy to study. He was elected a member of the Royal Academy in 1800. Flaxman designed ornaments for Wedgewood's noted wares, and also the statues of Nelson, Howe, and Reynolds in St. Paul's. He designed a series of figures to illustrate the *Odyssey*, Dante, and Aeschylus. He is remembered best as the designer of Achilles' shield, which gives his conception of the shield as it is described by Homer. The Flaxman Museum of University College, London, contains a number of original models and drawings.

Flea, flē, a small wingless insect at home on animals. The body of the flea is flat, enabling it to glide between the hairs of its host, an operation further facilitated by a smooth, hard coat of scales. A flea is a great jumper, proverbially hard to put one's finger on, and hard to hold. Some curious mind has calculated that if a boy were able to leap as far and as rapidly, in proportion to his weight, as a flea, he could hop around the world before breakfast. Fleas drop their eggs to hatch and breed usually on the floor. Carpets are especially desirable from the point of view of a flea. The larvae are scavengers. They find vegetable and animal matter in the dust.

Fleming, Sir Sandford (1827-1915), a builder of the Intercolonial Railway and inventor of the system of standard time. He was born at Kirkcaldy, Fifeshire, Scotland, where he first studied surveying. He removed to Canada in 1845, and in 1857 became chief of the engineering staff of the Northern Railway. In 1863 he was chosen by the settlers in the Red River Valley to request from the British government railway communication between the Red River and eastern Canada. The result of this agitation was the Intercolonial Railway. In 1871 Sir Sandford was made chief engineer of what is now the Canadian Pacific Railway, and by 1877 had surveyed the entire route to the Pacific coast almost as it now exists. While engaged in this work he also procured at his own expense the survey of a railroad in Newfoundland. All of this engineering work was, however, subordinate to Sir Sandford's plan for consolidating the British Empire by railroads, telegraphs, and submarine cables. In 1879 he submitted to to the Canadian government a scheme for linking Canada to England and Australia to New Zealand by cable. His plan, almost unchanged, was put into operation in 1902. Sir Sandford had always been interested in universal or cosmic time. He was desirous of perfecting a system of standard time that would obviate all confusion on railroads. As a result he proposed the standard time system now in general use. Sir Sandford was an active member of numerous learned and scientific societies, and was for a time the president of the Canadian Royal Society. In 1897, Queen Victoria made him knight commander of the Order of St. Michael and St. George.

Flicker, a common woodpecker.

Fletcher. See BEAUMONT.

Fleur-de-lis, or **Flower-de-Luce.** See IRIS.

Flicker, a golden-winged woodpecker common in the United States. It is about twelve and one-half inches long. From tip to tip of its outstretched wings it measures twenty inches. The under surfaces of the wings and tail are golden yellow. It has a scarlet crescent and round black spots on the under parts, which are white. It has a black shield on the breast. A peculiarity of the male is a pair of black mustaches. It lays a number of crystal white eggs in a nest in the hole in the trunk of a tree. See WOODPECKER.

Flint, a common form of quartz. It is composed essentially of silica. It is related to chalcedony, but it has a light gray or brownish color and lacks luster. It is of concretionary origin and occurs as nodules or sheets in many parts of the world. The chalk cliffs of France and England are noted for flint.

Owing to its proverbial hardness, and the ease with which it may be chipped into flakes having sharp cutting edges, flint was very likely the first material used by prehistoric man for knives, hatchets, arrow-heads, and spear points. Great numbers of these ancient implements have been found in localities thought to be the sites of prehistoric villages, both in the Old World and in the New. Flint was at one time the chief dependence of the civilized world as a means with which to kindle a fire. In making a fire the flint was held in one hand and a piece of steel in the

other. A succession of rapid, glancing blows produced a shower of sparks that fell into a handful of tow, lint, dry leaves, punk, or some other form of tinder. The slender blaze was fed with care. The traveler or hunter caught in a rain was by no means certain of kindling a fire. Flint and steel were replaced by matches about 1835.

In the old flint-lock musket, the flint was held in a slot in the hammer. As it descended it struck a grinding, glancing blow on a piece of steel affixed to the barrel of the gun. The sparks fell into a pan containing a pinch of powder called priming. In case the priming burned without exploding the charge of powder in the barrel, it was said to flash in the pan—a most exasperating, but by no means infrequent experience. The soldiers of the American Revolution carried flint-lock muskets. The flint-lock gave way to the percussion cap about the same time that matches came on the market. The cutting of flints for these purposes was at one time an important industry. Flint is now used chiefly as an ingredient of potter's clay. In 1903 $157,000 worth was ground for this purpose in the United States alone.

The making of flints is an interesting process. It is the oldest industry in England. It is centered at the village of Brandon, Suffolk County, amid the treeless fens of Ely. Primitive implements and relics found here indicate that Brandon was a source of the flint remains of Europe, characterizing what is known as the Stone Age. Antiquarians even venture the assertion that flints have been quarried and shaped at Brandon for anywhere from 10,000 to 50,000 years. The vocabulary of the peasantry contains words not heard elsewhere in the world. It is quite supposable, at least, that these words were used thousands of years ago by prehistoric man.

At the present time the industry consists of four steps,—quarrying, quartering, flaking, and knapping. The flint district is a common. There are hundreds and thousands of old pits. They are known as "Grimes' graves." Permission to dig a fresh pit is obtained readily. The digger preëmpts a spot by placing a piece of chalk at each corner. He first digs a square pit as deep as one would care to jump into; then excavating underneath at one side, he digs another pit like the first; then a third, and so on; thus constructing a huge underground, zig-zag series of steps reaching down forty or fifty feet to the layer of chalk in which the best nodules of flint are found. Huge chunks weighing up to 200 pounds are mined and pushed up to the surface by means of the great underground stairway described. The chunks are dried in the shade. They then pass into the hands of a skillful workman, who splits them into brick-like squares by means of a heavy, peculiar hammer. One who does not know just where and with what force to strike will break a flint nodule into comparatively worthless fragments. The quarters, as the nicely squared pieces are called, then go to the flaker. This is the most difficult part of the whole business. An expert flaker steadies the quarter with one hand and works along its edge with a long steel hammer held in the other hand. His hammer rises and falls with such rapidity that long, flat, knife-shaped flakes, one for each blow, fall into a basket at the rate of 5,000 to 7,000 a day. Although the flaker does his work with apparent ease, he requires to have a quick, mechanical eye, and to know the angle, the spot, and the force requisite to a nicety. None but an expert can flake. A bungler simply wastes material. The knapper breaks the flakes into oblong pieces and trims them to size. He wears a heavy apron and sits on a stool. He holds the flakes in his left hand, and a light knapper's hammer in the other. A six-inch iron stake driven into the upper end of a block serves him for an anvil. From four to five flints are made from a flake. A skillful knapper turns out from 2,000 to 3,000 flints a day. Eight sizes are recognized in the trade,—the long Dane, fowling, musket, carbine, horse pistol, single, rifle, and pocket pistol. The largest size is 1¾ inches long by 1 inch in width; the smallest is ⅝ of an inch long by ½ inch in width. The knapper counts up his finished flints much as a banker counts coin. He separates them into sizes and sweeps them out with a nail, five at

a time. For each hundred, he lays aside a counter. He packs his flints in sacks containing from 5,000 to 20,000 each, and ships them to Liverpool, Bristol, Birmingham, or London.

Before the invention of matches and percussion caps, the flint industry was an enormous one. The East India Company, the Hudson Bay Company, and the various countries of Europe placed enormous contracts with the smallarms makers who derived their supplies from Brandon.

See FIRES; MATCHES.

Flint, Mich., is situated on the Flint River, 64 miles northwest of Detroit, and is the county seat of Genesee County. The Chicago and Grand Trunk and Pere Marquette railroads enter the city. Flint, sometimes called the "Vehicle City" is one of the most important centers in the United States for the manufacture of automobiles, buggies and carriages. The automobile industry in particular has had a remarkable growth here in recent years. The most important manufactures after those mentioned are electric stoves, flour, iron products, cigars, woolen goods, bricks and tiles. A state institution for the deaf and dumb, and Oak Grove Hospital, a private insane asylum, are located here. Flint was incorporated as a village in 1831 and chartered as a city in 1855. Population, in 1920, 91,599.

Flittermouse. See BAT.

Floating Dock. See DOCK.

Flock, in the textile industry, finely powdered wool or cloth used as shoddy. Flock may be produced by grinding up old rags, or it may be the waste fiber from the shearing, brushing, and napping which woolen fabrics are subjected to in finishing. Flock is used largely in "fulling" cheap goods. It is spread on the wrong side of the cloth, and is worked into the meshes during the fulling process by the application of heat, moisture, and pressure. The weight of goods made from poor fiber is increased by the flock. Moreover, the cloth is actually made more bulky and warmer. The flock may loosen and drop out before the thread wears An objectionable feature of the use of flock is this tendency to loosen and roll into little wads, which collect between the fabric and the lining of a garment. The lining of men's coats and overcoats is left loose at the bottom that the flock may drop out and not lodge in rolls. The use of flock to thicken cloth is by no means a modern invention. Latimer described it in a sermon delivered before Edward VI in the year 1549:

> If his cloth be xvii yeards long, he will set him on a rack, and stretch him out with ropes, and racke him till the sinews shrinke again, whiles he hath brought him to xviii yeards. When they have brought him to that perfection, they have a pretie feate to thicke him againe. He makes me a powder for it, and plaies the poticarie, they call it flock-powder, they do so incorporate it to the cloth, that it is wonderful to consider, truly a good invention. Oh, that so goodly wits should be so ill applied! They may wel deceive the people, but they cannot deceive God.

Flodden Hill, the most northeasterly eminence of the Cheviots. It is in Northumberland, near the Scottish border. It is now a sheep run. It is noted in history as the scene of the battle of Flodden, in which the Scots received a notable defeat at the hands of the English. King James IV, grandfather of Mary Queen of Scots, and the Earls of Huntley and Home assembled a large army at Edinburgh and marched southward to meet the English. The battle was fought September 9, 1513. A popular account of the Scottish forces, and of the bloody battle in which the Scots showed no lack of courage, may be read in *Marmion.* King, noble, and peasant fell before the English archers. When night came at last on Flodden Field, 10,000 Scots lay dead upon the hillside. It was the saddest day ever witnessed by Scotland. Seemingly not a home but mourned its dead. The pathetic side is well put by Jane Elliott in her *Lament for Flodden Field:*

> Dool and wae for the order, sent our lads to the Border!
> The English, for ance, by guile wan the day;
> The Flowers of the Forest, that fought aye the foremost,
> The prime of our land, are cauld in the clay.
> We'll hear nae mair lilting at the ewe-milking;
> Women and bairns are heartless and wae;
> Sighing and moaning on ilka green loaming—
> The Flowers of the Forest are weded away.

Flood, a great body of water overflowing land not usually covered by water.

The commonest floods, the annual inundations of rivers, due to spring rainfall and the melting of snow, have been mentioned under the names of different rivers. Unlooked-for, destructive floods are due to various causes, such as unusually heavy rains, the bursting of dams, dikes, levees and reservoirs, great windstorms which drive the sea water inland, earthquakes, volcanic eruptions, and cloud-bursts. We have records of disastrous floods as far back as 684 A. D. when 780 square miles of the Island of Shikoku, Japan, were overrun by the sea. Holland has suffered most from inundations of the ocean; in at least four of these great floods over 100,000 people perished at one time. But modern dikes are more stable than the old sea-walls, and for 250 years no such disaster has occurred there.

Recent floods in the United States are those at Johnstown, Pennsylvania, in 1887 when 2,209 lives were lost by the bursting of a reservoir; at Galveston, Texas, in 1900, with a loss of 6,000 people and 3,000 buildings, and at Heppner, Oregon, in 1903, when 300 people perished in a cloudburst; at Dayton, Ohio, in 1913, when 87 people lost their lives and property valued at $128,000,000 was destroyed; and at Pueblo, Colorado, in 1921, which destroyed property to the value of $15,000,000 and caused a considerable loss of life. Hot Springs, Ark., was damaged in May, 1923.

Flora. See MYTHOLOGY.

Florence, a famous city of northern Italy. It is situated on both banks of the River Arno at the foot of the Apennines —a site of great natural beauty. The surrounding country is noted for its fertility—a fact hinted at in the name which, in the Italian, signifies flowery or flourishing, somewhat akin to our Florida. The site was occupied originally by a force of Roman soldiers. The old military camp grew into a trading city of importance. Like Pisa, Milan, and other commercial towns, it long maintained a sort of independence. The city was laid out four square and was surrounded by massive walls. Bridges across the Arno connect the two parts of the city. That of Santa Trinita is noted for its graceful arches.

So long as traffic with the East was maintained by way of Venice and the caravan routes of western Asia, Florence was one of the most flourishing and powerful cities in Europe. It was for a time the monetary center of the West. During the thirteenth and fourteenth centuries, the florin, taking its name from this city where it was first minted, was the chief commercial coin. The money changers, money lenders, jewelers, goldsmiths, and merchants of Florence were the wealthiest men in the world.

As it led in wealth and influence, so Florence was also the first city in the West to rescue the painting, the sculpture, the architecture, and the literature of the Greeks from universal neglect. The city became noted as a center of art and literature. Few cities can boast a longer list of celebrated names. Dante, Petrarch, Boccaccio, Raphael, Leonardo da Vinci, Michelangelo, Savonarola, Lorenzo de Medici, Machiavelli, and several noted popes were either natives or citizens of Florence. The Medici family was the wealthiest and most powerful family. Despite the efforts of Savonarola, the Medicis gradually acquired or assumed ducal authority and the manners of the city became voluptuous.

Though its political influence and wealth have disappeared, Florence is still one of the most noted art centers in Europe. Numerous gardens, museums, palaces, galleries, and churches preserve the paintings and sculpture produced or acquired during the days of civic prosperity. Especially celebrated is the Uffizi Gallery. It surrounds two sides and an end of an oblong. Among the masterpieces of statuary are *Niobe and Her Children, The Faun, The Knifegrinder,* and the *Venus de Medici,* famous as the most beautiful representation of the female form known. The wing devoted to paintings contains many masterpieces also. It is considered by many the most celebrated and precious collection of paintings in existence.

Florence is a city of marble. The public squares are adorned with palaces, statues, and fountains. The Campanile or belltower is a noted structure. There are over 150 churches, many worthy of in-

spection. The cathedral is surmounted by a vast dome, 138 feet in diameter. Its apex is 380 feet above the pavement. The interior is nearly 500 feet in length. The most celebrated church is Santa Croce, called the Pantheon of Florence. It contains the tombs of Michelangelo, Galileo, Machiavelli, and other noted men.

The present population of the city is somewhat more than 200,000. It is still an important center of industry. Silks, straw hats, jewelry, cut stones, perfumes, porcelain wares, alabaster vases, terra cotta work, tiles, leather, and carvings are the chief manufactures. The mildness of the winter, the treasures of art, the cheapness of quarters once occupied by the nobility, and the numerous places of amusement render Florence an attractive place of residence. See CATHEDRAL; ITALY; SAVONAROLA; MACHIAVELLI; MEDICI.

Florence, Alabama, a manufacturing city and the county seat of Lauderdale County, is situated on the Tennessee River at the foot of the Muscle Shoals Canal, 125 miles northwest of Birmingham. It is served by the Louisville and Nashville and the Southern railroads, and has boat connections with Chattanooga, Tennessee, and with the Gulf of Mexico. It is in the center of a productive coal, timber and iron region, and its industrial establishments produce fertilizer, wagons, engines, pig iron and boilers. Florence is the seat of Mars Hill Academy, Florence Synodical Female College, Burrell Normal School and a State Normal School. A large public park, and numerous handsome buildings add to the attractiveness of the city.

Floriculture, flō′rĭ-kŭl-tūr, the business of producing cut flowers and ornamental plants. In the United States this industry came into prominence about 1825, first in the vicinity of Philadelphia and Boston. New York had a reputation for many years of being behind other large cities in the demand for flowers. In the early days of the industry, as we learn from *Bailey's Cyclopedia,* the camelia, the tuberose, and the heliotrope were in chief demand for cut flowers. Fuchsias, geraniums, and bulbs of various kinds were favorites for bedding and ornamental purposes. About the middle of the century the rose, the carnation, and the violet led in popular favor. After the close of the Civil War florists found their business profitable all over the country. At the present day it is a small town indeed that is without its florist and greenhouses. Cut flowers and house plants are for sale everywhere. Florists now receive many orders for flowers to be sent out by express for wedding, funerals, parties, and parlor and church decorations. According to present estimates, there are about 12,000 florists' establishments in the United States, employing at least 15,000 clerks and managers. Many more people are engaged in raising flowers. The annual sales at retail are estimated at about $25,000,000, three-fifths of which is spent for cut flowers, the rest for house plants. Named in order of popularity, the leading cut flowers are now roses, carnations, violets, and chrysanthemums. One hundred million cut roses, worth $6,000,000, are sold annually. The florist realizes $4,000,000 for as many carnations. He sells 75,000,000 violets. Lilies, hyacinths, tulips, and orchids follow in the order named.

Florida, the most southeastern state of the Union, was given its name by Ponce de Leon, who was the first European to visit the state, in 1512. It is alleged that he landed on "flower day" known in Spanish as Pasqua Florida. Because of its shape Florida is called the Peninsula State.

SURFACE. The northwestern part of the state is an extension of the upland region in Alabama and is hilly and rolling. The highest recorded point of land within the state is Iron Mountain, in Polk County, with an altitude of 325 feet. The land along the coast is low and level and often marshy. Extensive areas are covered with forests of long leaf pine. In the southern part of the peninsula is a large cypress.

The most important rivers are the St. Mary's forming a part of the boundary between Florida and Georgia, the St. John's which is nearly 400 miles in length and navigable as far as Jacksonville, the Peace, flowing into Charlotte Harbor, the Suwanee crossing the state from north to south and famed in song, and the Apal-

achicola, which is an extension of the Caloosakatchee and Flint and is navigable over its entire length. The state is noted for its many springs and underground streams connecting lakes. Silver Spring, near Ocala, is, so far as is known, the largest spring the world. It is about 500 feet wide and 500 feet deep. About two miles off the coast, near St. Augustine, the spring comes to the surface with such force as to roll back the waters of the ocean in waves.

The coast line is low and level and over 1,000 miles in extent, giving Florida the longest sea coast of any state in the Union. On the eastern coast the estuaries of St. Mary's and St. John's rivers afford good harbors, but natural harbors are few. On the western coast, however, there are a number of harbors which the largest vessels can enter, among these are Charlotte Harbor and Tampa and Pensacola bays. There are a number of harbors among the Florida Keys but that at Key West is the most important.

CLIMATE. Florida is noted for its mild equable climate. Frost seldom appears and, notwithstanding its latitude, the position of the state with reference to the ocean gives it a mild and pleasant climate throughout the summer. During the winter the state becomes a favorite resort for thousands of tourists. The average annual rainfall at Jacksonville is 55 inches and over 60 inches in some places on the Gulf Coast. The rainy season is from June to September.

POPULATION. The census of 1920 gave Florida a population of 968,470, which was a gain of 28.7 per cent in ten years. There were seventeen cities with over 10,000 inhabitants. Notwithstanding the growth of the cities the majority of the population is rural. During the winter the population is increased by several thousand because of the influx of tourists.

MINERALS. The most important minerals are phosphate rock and fuller's earth. Previously to the World War the former was exported in large quantities for fertilizer, and the home trade in this rock is still important. Florida is the largest producer of fuller's earth of any state in the Union. The export of other minerals is negligible.

AGRICULTURE, is the leading industry and fruit constitutes the most important crop. The soil is fertile and moisture abundant, and Florida leads in the production of pineapples, bananas and grape fruit. The orange crop is important and averages about 8,500,000 boxes annually while the grape fruit crop averages about 5,000,000 boxes. Corn, oats, peanuts, rice, Irish potatoes, sweet potatoes, sorghum and sugar cane are important field crops. Large quantities of tobacco are raised and pecans are becoming important. The soil and climate are adapted to the growth of Sea Island cotton but owing to the ravages of the boll-weevil production has fallen off since 1910. Large quanties of garden truck are raised for northern markets, where they find a ready sale because they are marketed duirng the winter and early spring. Livestock raising receives careful attention and within recent years marked improvement in breeds of cattle and horses has occurred.

The drainage of the Everglades and other swamplands is an important factor in the agricultural development of the State.

OTHER INDUSTRIES. The leading industry in the point of value is the manufacture of cigars, which is carried on chiefly in Tampa and Key West; next to this is lumbering. Florida is one of the leading states in the output of cypress and in the production of yellow pine. Pine forests yield large quantities of turpentine and rosin and the state is noted for its naval stores. Owing to the abundance of phosphate rock the manufacture of fertilizer is a rapidly growing industry.

TRANSPORTATION. Key West, Tampa, Pensacola and Jacksonville are all important ports and have steamship connection with Cuba and the leading ports of the states on the Atlantic coast as well as the leading ports of Europe. There are about 5,300 miles of railway in the state and all the important cities have railway connections. The Florida and East Coast line extends the entire length of the state along the the Atlantic coast and is constructed over the Florida Keys to Key

West, the intervals between the islands being spanned by bridges. This is probably the only railway in the world that has so long a line extending into the sea. Other important railway lines are the Seaboard, the Atlantic Coast Line and the Louisville & Nashville railroads. Highways are being rapidly improved in the interests of auto tourists.

EDUCATION. The University of Florida at Gainesville is at the head of the educational system. It was founded in 1905 and has an enrollment of over 1,300. The faculty includes over 60 members and the library contains 40,000 volumes. The University has made special provision for the study of the agricultural, scientific, legal, educational, business and social conditions of the state. There is a state college for women at Tallahassee and other higher institutions of note include Rollins College at Winter Park, the John B. Stetson University at De Land, Palmer College at De Funiak Springs and Southern College at Lakeland. There are four schools for the higher education of negroes, besides numerous colleges and secondary schools maintained by various church denominations. The school for the deaf, dumb and blind is at St. Augustine, the Industrial School for Boys (delinquent) is at Marianna and the Industrial School for Girls (delinquent) is located near Ocala.

GOVERNMENT. The present constitution was adopted in 1886. The legislature consists of a senate of 32 members elected for four years, and a house of representatives of 68 members elected for two years. Sessions of the legislature are held biennially and are limited to 60 days. The governor is chosen for four years and is not eligible to succeed himself. The other state officers are the attorney-general, secretary of state, comptroller, commissioner of agriculture, treasurer, and superintendent of public instruction. The courts consist of a supreme court, circuit, criminal and county courts, which are aided by courts of justices of the peace.

HISTORY. Florida was discovered in 1512 by Ponce de Leon, who was in search of a fountain of perpetual youth. Later Narváez and de Soto entered the country. The first settlement was made at St. Augustine in 1565. This is the oldest town in the United States. In 1699 Pensacola was founded by the Spanish. The region came under the control of the English in 1763 but was returned to Spain in 1783 and was transferred to the United States in 1819. Florida was admitted as a state March 3, 1845, becoming the 27th state in the Union. For a number of years preceding the admission there was continuous warfare between the settlers and the Seminole Indians, who were finally transferred to lands west of the Mississippi. Florida seceded from the Union in 1861, rescinded the ordinance of secession in 1865, and three years later framed a new constitution and was re-admitted to the Union. In 1921 the legislature proposed an amendment to the constitution designed to give more adequate representation to those parts of the state whose population had been greatly increased in the last decade. This amendment was voted on at the November election in 1922 but did not carry. Several new counties were organized between 1910 and 1920.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Land area, square miles	54,861
Water area, square miles	3,805
Forest area acres	22,000,000
Population (1920)	968,470
White	638,953
Negro	329,487
Chief cities:	
Jacksonville	91,558
Tampa	51,608
Pensacola	31,035
Miami	29,571
Tallahassee	5,637
Number of counties	52
Members of state senate	32
Members of house of representatives	75
Salary of Governor	$6,000
Assessed valuation of property	$409,588,938
Bonded indebtedness	$601,567
Farm Area, acres	6,046,691
Improved land, acres	2,297,271
Corn, bushels	11,032,000
Oats bushels	533,000
Tobacco pounds	3,600,000
Rice, bushels	88,000
Cotton bales (500 lbs.)	13,000
Oranges, boxes	8,200,000
Wool clip, pounds	391,000

Domestic Animals:	
Horses	58,000
Mules	40,000
Milk cows	156,000
Other cattle	917,000
Sheep	89,000
Swine	1,493,000
Manufacturing establishments	2,581
Capital invested	$206,294,000
Raw material used	$ 92,362,000
Operatives	74,415
Output of manufactures	$213,675,000
Turpentine, gallons	8,824,295
Rosin barrels	414,226
Lumber, feet	950,000,000
Miles of railway	5,221
Teachers in public schools	6,821
Pupils enrolled	225,160

Florida Keys. See KEY WEST.

Flotow, Frederick von (1812-1883), a German composer of light opera, whose *Martha* and *Allesandro Stradella* are still in the modern repertoire. He was born at Teutendorf, Mecklenburg. He studied in Paris, but was forced by the revolution of 1830 to return to Mecklenburg. Herr Flotow devoted himself exclusively to composition from this time on, but met with small success with his first operas. His work is noted for brisk dramatic action and pleasing melodies. The most important operas besides those named are *Indra, L'Ombre, L'Ame en Peine, Il Flor d'Harlam*, and *Enchantress.*

Flotsam and Jetsam, goods lost at sea. Flotsam applies to goods found floating; jetsam to articles that sink to the bottom. According to English law, goods cast on the shore belong to the finder, while flotsam and jetsam belong to the original owner. In case the owner can prove property the finder must deliver up goods recovered at sea. The finder is entitled to reasonable charges, known as salvage.

Flounder, a flat fish that swims on one side. It is related to the halibut, sole, and turbot. It is a salt water fish. It frequents muddy shores in search of insects, worms, and small fishes. The body is oval. It is from ten to thirty inches long. A long dorsal and a ventral fin almost surround the body like a fringe. The body is so thin that "flat as a flounder" has become a proverbial comparison. The flounder is a fair table fish. It has the merit of keeping fresh a long time. Some say our verb to flounder is related to the name of the fish. There are several kinds, both British and American.

The fish called the Flounder, perhaps you may know,
Has one side for use and another for show;
One side for the public, a delicate brown,
And one that is white, which he always keeps down.
A very young flounder, the flattest of flats,
(And they're none of them thicker than opera hats,) etc.

—Oliver Wendell Holmes.

Flour, a fine meal. In American usage, flour, if unmodified, is understood to mean wheat flour. It is obtained by crushing wheat kernels and sifting the fine particles through bolting cloth. The mills of primitive man form an interesting chapter in archaeology. They consisted at first of a hollowed stone in which to place the kernels and a second stone used as a hammer to crush the grain. The druggist's mortar and pestle is but a primitive mill. Then came the rocking stone for the upper stone, and when later a sweep was lashed to the upper stone and persons or animals were employed to push the sweep and turn the stone, the world had the upper and the nether millstone, in essential respects,—the mill that served its purpose for centuries, and it may be for thousands of years, but at all events until the Hungarian steel roller process was adopted.

The American colonists sent back to Europe for small mills as soon as they began to raise grain. The Dutch set up a horse-power mill on the island of Manhattan as early as 1626. In 1628 there is record of a windmill near Watertown, Massachusetts, and of a water mill turned by the falls of the Neponset at Dorchester in 1634. By 1649 Virginia was exporting wheat flour, the product of four windmills, five water mills, and an unknown number of horse mills on various plantations. Delaware became noted for flour shortly after the Revolution. Wilmington was the center of a flouring district that included 130 mills. Many of these were driven by the Brandywine River.

The seat of the flouring industry shifted from time to time and new centers grew up, first along the Atlantic, then in the interior. Three factors were essential, a re-

gion of wheatgrowing, water power, and facilities for shipment of flour. Thus we find that, in 1840, Baltimore and the Patapsco river had sixty flouring mills; in 1845 Richmond and the James river had twenty-one, including the largest mills then known. Richmond shipments amounted to 250,000 barrels a year. The wheat of the Mohawk Valley, the falls of the Genessee, and the Erie Canal made Rochester the great milling center of North America for a time. In 1865 the Rochester mills ground 800,000 barrels of flour. With the introduction of steam power, Cincinnati, St. Louis, Milwaukee, and other milling centers were developed. Flour milling at the Falls of St. Anthony, on the Mississippi River, in Minnesota, began with a small, crude government mill in 1823. This mill supplied the garrison at Fort Snelling with flour, and merchant milling began in the village of Minneapolis in 1854, four years after the first house in the village, which was established across the river from the old village of St. Anthony, was built. In 1856 Minneapolis was incorporated as a town and in 1867 as a city; and St. Anthony was annexed in 1872, after which the growth of the city of Minneapolis was rapid, until it became the largest flour and lumber market in the world.

The water power at the Falls of St. Anthony, which operates the huge flour mills of Minneapolis, was developed previous to 1879 to generate 30,000 horse-power, and in 1897 a new dam, giving 10,000 additional horse-power, was completed. Since that time the United States government has constructed a system of locks and dams below the Falls which added 40,000 horse-power, and the flour mills in the Falls district are now the largest in the world.

The Hungarian process of flour milling was generally adopted in the late seventies, about the time Minneapolis began to rival Budapest as the greatest milling center. This process substituted rollers for stones to perform the grinding of the wheat, and it is claimed that prior to 1870 a French miller named La Croix invented an independent system of roller milling similar to the so-called Hungarian system, and installed it in a Minneapolis flour mill. This marked a new era in the milling industry. The new process subjected the wheat to a succession of grindings between several sets of iron or porcelain rollers, instead of the former single grinding between millstones. Steel rollers are now generally used. The rollers are kept cool during the process, as the flour would have a dark color and musty odor if heated while being rolled.

In modern milling the object is to produce from the wheat or other grain a maximum amount of flour of good appearance and quality, with a minimum of bran and "shorts," or coarse meal. The wheat is thoroughly dry-cleaned by screening and scoured before milling. It is then steamed, or otherwise dampened, to prevent the bran from splitting up into small particles and getting into the flour. When the grain is passing through the mill, and each pair of rollers reduces it to a finer texture, the successive steps are called breaks. Most modern mills employ what is called the four-break system. Each break effects a mechanical separation of the mass, or "chop," into break flour, middlings flour and tailings, and when the milling process is completed practically all the flour stock is separated from the portions of the grain which are regarded as unfit for human food.

Standard grades of flour or special commercial brands are made by blending the different streams of break flour and middlings. Standard grades include first patent flour, second patent, straight grade, first clear, second clear, etc. Bakers commonly use the first clear grade of flour, and the first and second patent grades are those usually sold at retail. Besides these flours the mills produce Graham flour and whole wheat flour, the first being unbolted wheat meal ground from the whole kernel. Self-raising flour, used in domestic cookery, has some leavening substance like ordinary baking powder mixed with it.

Flour milling on a small scale is still a flourishing industry, and besides the large merchant mills there are many custom mills, commonly called gristmills, which grind wheat, corn and other grain re-

ceived from neighboring farmers. Thus recent statistics show that there were in the United States in 1920 no less than 10,708 flour and grist mills in operation, giving employment to 45,481 wage-earners, with flour products valued at a total of $2,052,434,385. The number of mills had slightly decreased in the preceding five years, but the number of employees had considerably increased, indicating the growth of merchant mills; and during this time the value of flour products had much more than doubled.

In 1921 the United States exported 16,179,956 barrels of wheat flour, valued at $154,524,355. In 1922 the exports were 15,796,819 barrels, valued at $97,386,091, reflecting a considerable drop in prices that year. See WHEAT; BREAD.

Flower, the part of a plant which produces seed. Ordinarily a small branch, called a flower stalk, supports the flower. Reduced leaves or bracts are usually present, but they are not properly parts of the flower. In the case of a sunflower they form a leafy sort of mat. Bracts form the cup of the acorn, the husk of an ear of corn, the chaff of wheat, the bur of the chestnut, and the cone of the fir tree. They form the leafy involucre of many plants. Jack-in-the-pulpit stands in a large green leafy bract, and the calla lily stands in a white one.

The parts of a complete flower are:

Protective—

1. A calyx of two to many sepals.
2. A corolla of one to many petals.

Essential—

3. Stamens, one to many—filament, anther, pollen.
4. Pistils, one to many — ovary, style, stigma.

Sometimes the corolla is absent or wanting. Sometimes both corolla and calyx as in the elm, are wanting. Sometimes the stamens are in one flower and the pistils in another on the same plant as in the case of corn, and sometimes the pistillate flowers are on one plant and the staminate on another, as in the case of the cottonwood. A complete flower has a calyx, corolla, stamens, and pistils. All these parts grow from the end of the flower stalk which is appropriately called the receptacle. The business of the stamen is to produce a dust, called pollen; the business of the pistil is to produce seed. It is the business of the corolla and calyx to shelter the stamens and pistils and show helpful, needful insects where the essential parts of the flower are.

See FERTILIZATION; FLORICULTURE; BOTANY.

Flower, Artificial, an imitation of a natural flower. Artificial flowers are made in great numbers, both in Europe and America. They are used as ornaments for women's hats and bonnets, and, to a less extent, for decorating the hair and for trimming gowns. The work is done almost entirely by hand, and gives employment to many women and girls. Muslin, silk, satin, and velvet are the fabrics usually employed. Petals for flowers and leaves are cut with a die or stamp machine. From twelve to forty-eight thicknesses can be cut through at one time. The petals are next dyed, or, if they are large, and shading is desired, they are painted with a brush. The leaves are veined by indenting with hot metal patterns and are crimped by pressing in a machine. A wire wound with tissue paper or silk thread is pasted along the center, and the leaves are tied in bunches ready for shipment.

The making of a flower is, of course, a more difficult performance. In making the larger flowers, as roses, a girl takes up each petal with a pair of pincers, deftly shapes it, and passes it to the next worker, who completes the shaping process. A third girl attaches a slender wire. These petals are then arranged about a small piece of cotton and the wires drawn together and twisted or wound to form the stem. In the more expensive roses the petals are each pasted into place. Stamens and pistils are formed of wire covered with silk, and dipped in gum water to form the anthers. Buds are shaped from cotton and covered with silk, or are sometimes of glass similarly covered. The assembling of the petals into a flower is a work of skill, and the maker of the higher grades must have the eye and touch of an artist.

PLANT FAMILIES

PLANT FAMILIES

The artificial flower industry has received a great impetus owing to the wide demand for artificial flowers for interior decoration which has been made in the last few years. Another interesting feature is the widespread use for the same purpose of natural grasses, ornamental leaves, etc., which are dried and painted, or colored in various ways.

Flowers, Language of, from earliest times flowers have had a meaning. The ancient Greeks and Romans had a flower language, which was revived during the Middle Ages. Thus, oak was the patriot's crown, a wreath of bay leaves for the poet, and for beauty, a crown of myrtle; ivy was the emblem of Bacchus, and the olive branch betokened peace. The queen of flowers, the rose, has many symbols and meanings—a red rose signifying "I love you," and the small white bridal rose, "Happy Love."

Naturally, from their loveliness, flowers have always been a favorite theme with poets and song writers. Some of the significations of flowers in poetry are:

Anemone	Anticipation
Apple Blossom	Preference
Butter Cups	Riches
Calla	Magnificent beauty
Candytuft	Indifference
Cowslip	Youthful beauty
Daffodil	Unrequited love
Dandelion	Coquetry
Forget-me-not	True love
Foxglove	Insincerity
Geranium	Deceit
Gentian	Virgin pride
Goldenrod	Encouragement
Heliotrope	Devotion
Honeysuckle	Fidelity
Hyacinth	Sorrow
Lilac	Fastidiousness
Marigold	Contempt
Lily	Majesty, purity
Narcissus	Self-love
Pansy	Thoughts
Poppy	Oblivion
Snowdrop	Friend in need
Sweet William	Gallantry
White Violet	Modesty

Flowers, National. The following are among the chief national flowers:

Canada	Maple Leaf
China	Narcissus
Egypt	Lotus
England	Rose
France	Fleur-de-lis
Germany	Cornflower
Greece	Violet
India	Lotus
Ireland	Shamrock
Italy	White Lily
Japan	Chrysanthemum
Mexico	Nopal cactus, or prickly pear
Persia	Rose
Scotland	Thistle
Spain	Pomegranate
Switzerland	Edelweiss
United States	Goldenrod
Wales	Leek

Goldenrod, the national flower of the United States can hardly be said to be the national flower in the same sense as in other countries, where custom and tradition has determined it. In an attempt to select a national flower, however, the goldenrod received the most votes.

Flowers, State. Nearly every state has adopted a flower growing in the state as its emblem. The selection has usually been made by school children, as follows:

Alabama	Goldenrod
Alaska	Forget-Me-Not
Arizona	Sequoia Cactus
Arkansas	Apple Blossom
California	Golden Poppy
Colorado	White and Blue Columbine
Connecticut	Mountain Laurel
Delaware	Peach Blossom
District of Columbia	Nasturtium
Florida	Orange Blossom
Georgia	Cherokee Rose
Idaho	Syringa
Illinois	Violet
Indiana	Carnation
Iowa	Goldenrod
Kansas	Sunflower
Kentucky	Goldenrod
Louisiana	Magnolia
Maine	Pine Cone and Tassel
Maryland	Black-Eyed Susan
Michigan	Apple Blossom
Minnesota	Moccasin
Missippi	Magnolia
Missouri	Goldenrod
Montana	Bitterroot
Nebraska	Goldenrod
Nevada	Sagebrush Shrub
New Jersey	Sugar Maple (tree)
New Mexico	Cactus
New York	Rose
North Dakota	Goldenrod
Ohio	Scarlet Carnation
Oklahoma	Mistletoe
Oregon	Oregon Grape
Rhode Island	Violet
South Dakota	Anemone
Texas	Blue Bonnet
Utah	Sego Lily
Vermont	Red Clover

Washington	Rhododendron
West Virginia	Rhododendron
Wisconsin	Violet
Wyoming	Gentian

Floyd, John Buchanan (1807-1863), an American statesman and Confederate soldier, was born at Blacksburg, Va., and educated at the College of South Carolina. Following his admission to the bar, he began the practice of law in Helena, Ark. In 1839 he returned to Virginia, where he became interested in political affairs. He served several terms in the state legislature and was governor of Virginia from 1846 to 1852. In 1857 Floyd became Secretary of War in Buchanan's cabinet, where he used his position to favor the South in the controversy over slavery. His resignation was requested in 1860. At the outbreak of the war he joined the Confederate army, and was given the rank of brigadier-general. He was in command of Fort Donelson when it was attacked by General Grant, but fled the night before the fort surrended, leaving General Buckner in command. For this act he was relieved of his command.

Fluorescence, flū-o-rĕs′sens, a name given to the phenomenon in light, arising when non-luminous short wave-lengths become visible as a result of absorption by certain substances. If the light waves beyond the violet of the spectrum pass through a solution of quinine or of horse-chestnut bark, they are lengthened so as to produce a pale glow. It is a case of the more rapid vibration being slowed down upon absorption. The continuance of the glow after the removal of the light is known as phosphorescence.

Fluorine, flū′or-ĭn, a chemical element, long known in its chief compound fluor-spar, but not isolated till 1886 by Moissan. It is a pale yellowish gas, irritating and poisonous. It is so active that it does not exist free, but attacks anything at hand, except oxygen, with which, alone among the elements, it does not unite. It is found in minute quantities in the teeth and bones, and in sea-water. It is the first member of the group with chlorine, bromine, and iodine. Hydrofluoric acid acts energetically upon glass and is widely used in etching.

Flute, a wind instrument of the pipe kind. It belongs to the same class as the fife, flageolet, piccolo, and boy's whistle. The sound is produced by a current of air striking the edge of a hole in the side of the tube. Scientists are not agreed as to the correct explanation of the vibrations of the air. The more ancient or direct form, well known to the Hebrews and to the Greeks, was held straight away from the player, who blew through a mouthpiece at the end. The modern or transverse flute is played by blowing through a mouthpiece in the side of the tube. The so-called German flute has six finger holes, and from six to twelve keys for semitones. Its compass is three octaves ranging from middle C upward. The piccolo is an octave higher. The tube of the flute is about twenty-seven inches long, and may be made of boxwood, ivory, ebony, silver, and even glass. The mountings are, of course, as expensive as the buyer may care to pay for. The flageolet is a small, direct flute. The fife is a single octave flute of the transverse sort. A skillful fifer, however, can reach two or possibly three octaves. By French writers, the direct or end flute is called the *flute-a-bec,* or the flute with a beak, in allusion to the beak-like mouthpiece at the end.

Flux, a material added to an ore or mineral to assist its fusion. The most common illustration is in the reduction of iron ores, where limestone is chiefly used. It combines with the clay, sand, and rock, forming what is known as slag, leaving the metal free. The exact nature of the flux and its amount will depend upon the character of the ore. In glazing pottery fluxes are necessary also. See SLAG.

Fly, a two-winged insect. There are in North America sixty families of flies, including 8,000 known species. The common house fly bears the appropriate scientific name of *Musca domestica.* The fly passes through all four stages of insect life. The common house fly lays about 150 eggs at a time, preferably in horse manure. The maggots are cylindrical and footless. In a week's time they enter the pupa state, and in another week they emerge full-grown flies. The fly does not increase in size after it acquires its wings.

The middle portion of the fly, or the thorax, bears two gauzy front wings and three pair of legs. The second or rear pair of wings, to which an insect is entitled, is represented, in the case of the fly, by a pair of knobbed, club-shaped appendages, or balancers. No one knows just what use is made of them. It has been suggested that they serve as ears. The head is provided with a pair of inconspicuous feelers or antennae. The mouth parts are adapted to suck up water, filth, vegetable scum, blood, or any semi-fluid material. The most prominent feature is a pair of large compound eyes, composed of 125,000 facets, occupying the greater portion of the side of the head. Each facet represents the end of a tube running down to nerve endings which are sensitive to light. Most flies have, in addition, two or three small, simple eyes on the top of the head, between the compound eyes.

The abdomen, the third part of the body, is composed of several segments or rings. On the side of each segment is a small hole or spiracle, through which the fly breathes. A fly can stand with its head under water without inconvenience, but it drowns if its abdomen is under water.

The fly comes pretty near having its brain in its stomach. There is a well developed nervous system. The main enlargement or ganglion, the center of the nervous system—the brain, we may call it—lies in the floor of the body cavity. The head contains only a small portion of the nervous system. A fly having lost its head is able to walk about, though in an aimless way, with apparently as little inconvenience as though it had lost but a leg or a wing. It dies instantly if the real nervous center be injured.

The fly has a complete circulatory system,—heart, arteries, and veins. The alimentary canal is distinct. The sense of smell is located apparently in the antennae. As stated, the ears are believed to be located at the base of the balancers, although there is a theory also that certain hairs on the antennae serve as ears. When a living fly is held by the legs its wings vibrate rapidly. The apex of the wing describes a figure eight in the air. The buzz of the house fly is in "F." It is considered, therefore, that its wings vibrate 330 times per second. It is thought that the buzzing is increased by the rubbing of certain parts of the body upon each other. The fact that a fly can walk on a smooth pane of glass or upside down on a ceiling has given rise to the oft repeated explanation that the feet are furnished with surfaces that act like a boy's leather sucker. Such is not the case, however. The foot is sticky and adhesive. It is furnished also with hook-like appendages with which to cling to the slightest irregularity of surface.

The best preventive against flies is cleanliness about the premises. Flies breed in filth of all descriptions. However unwelcome they may be flies do an important work as scavengers. In untidy households they clean up and remove an immense amount of filth that might otherwise breed contagion. There is nothing in nature more repulsive than maggots; but they, too, have their work. They devour dead animals that would otherwise pollute the air. It has been said that a fly and its progeny of maggots will devour an ox or a horse in less time than would be required by a full grown lion.

The fly that fills a carcass with maggots is a buzzing blowfly with a steel-blue abdomen. The skippers that infest cheese, ham, and bacon are the maggots of a small, slender, black fly.

In spite of their manner of feeding, flies are scrupulously cleanly. They rub and brush and polish their feet and mouths with great care. The fly that bites so fiercely before a rain is not a house fly, but a stable fly. It is very similar in appearance to a fly that settles on a dog's ear. A fly that clusters on the backs of cattle in pastures is still another very similar fly that breeds in cow manure.

Flies are a source of contagion. They light in all sorts of filth to feed. They carry germs on their feet and mouth parts. It has been said that 250 American soldiers were killed by bullets during the Spanish-American War, and that 5,000 were killed by infectious diseases, the germs of which were conveyed by flies.

Fly Extermination. It is estimated that the fly costs the United States and Canada over 70,000 lives and $300,000,000 annually in preventable sickness. It is the universal distributor of filth-disease infections and is the most dangerous foe of the household and the community. The campaign against the fly has been developed since the beginning of the present century. Although much has been accomplished only a small part of the necessary work has been done. The greatest need in education is to create a public sentiment so strong that it cannot be ignored with impunity. The schools, the public press and the Federal and state governments are ready and anxious to lend their assistance. But without the co-operation of the people these agencies can accomplish nothing. Any campaign to be successful must have the active co-operation of every member of the community. It is useless to rid the home of flies if they are to crawl over the food on sale at the grocery and the meat market; if near neighbors allow flies to multiply without hindrance. Flies do not travel far and it is possible to free any village and small town from them by a united effort of the inhabitants.

Necessary Steps. The first paragraph of this article contains a brief life-history of the fly. (1) See that manure piles, garbage cans, swill barrels and all other receptacles containing filth are kept tightly covered. (2) The flies that appear in early spring have lain dormant during the winter. They are the progenitors of this season's crop, but they cannot lay eggs during the first two weeks. They must eat and gain strength. Place traps over places where these flies will feed. Kill every fly found in the house. If this work is thoroughly done throughout the community that community will be free from flies for the season. In places where flies have begun to breed, place flytraps in every available position where flies gather. Attract them to the trap by placing in it molasses and vinegar or some other food which they can scent at a distance. Every night kill the flies by plunging the trap into boiling water. Porches and windows on farm houses schould be screened, and sticky fly paper or some other device should be placed about the house to catch the few stragglers that enter through the screens. (3). Begin the work by calling a community meeting in the winter or early in the spring and complete an organization for exterminating flies before they appear. (4) Write the United States Department of Agriculture, Washington, D. C., and the department of health in your state, for pamphlets telling how to exterminate flies.

Flycatcher, a family of songless, perching birds given to catching insects on the wing. There are 350 world species, chiefly tropical; 35 species nest in the United States. By keeping a sharp lookout along the edges of copses and in open woodlands one cannot fail to see, ere long, a small olive-colored crested bird, sitting on a dry limb or dead shrub. Every moment or two it will dart off into the air, snap an insect, and wheel back to its old position. Each dart marks the capture of a passing insect. If undisturbed, a flycatcher will use the same perch for hours at a time. In the season for feeding the young a pair of flycatchers will carry hundreds family. Flycatchers, being insectiverous, are migratory in most parts of the United States. In South America a small brilliantly colored flycatcher is found, while in Mexico the larger Derby abounds.
of insects to their nestlings daily. The flycatchers are of untold service to the fruit raiser. Flycatchers have rather wide mouths, surrounded by bristles to facilitate the capture of their food. The pewee, phoebe, and kingbird are members of the

Flying Fish, a genus of sea fishes. The common flying fish is from twelve to fourteen inches long. Its pectoral fins, corresponding to front legs, are placed well forward of the middle of the body. They are wide, and long, like the wings of a bird. The flying fish, most writers say, has no power of beating the air like a bird and thus propelling himself with these fins; but, by leaping vigorously from the water to a height of say sixteen feet, and spreading these fins, it can sail on a downward course to a distance of possibly two hundred yards. When pursued by their

enemies, they may be seen flying by hundreds and thousands. It is not unusual for a fish to fall on a passing ship if the deck be not over ten to fifteen feet high.

Another leaping fish, the flying gurnard of the Mediterranean, has the power of directing its course and sustaining its leap even to a greater extent than the true flying fish of the Atlantic. Its flight at night is marked by phosphorescent gleams of light that form a brilliant spectacle.

The flying fish of southern California is pursued by the large fish known as the tuna. In an effort to escape, it projects itself into the air by a twisting filip of the tail. It rises a matter of sixteen feet, and, with a favoring breeze, is capable of coasting a quarter of a mile. The tuna races along under the flying fish aiming to catch it, so it is claimed, as a player does a ball. Sportsmen amuse themselves by shooting the flying fish as they rise. The sport might be more popular were it not that the plunging tuna is quite capable of sending an ordinary rowboat to the bottom.

Charles F. Holder in the *Scientific American* writes about flying gurnards. We quote the following paragraphs:

The fishes are veritable knights of the fin; are armored cap-a-pie, the head covered by a bony cap from which several spines turn backward. The side or pectoral fins are large and winglike, the rays connected by webs presenting an extraordinary surface, and seemingly having all the attributes of a wing. They are beautifully colored as well, and a marked contrast to the ordinary flying fish, which is usually a pure silver below and green or blue above; but the flying gurnard is a resplendent creature ablaze with tint and color.

The adult gurnard is about twelve inches long, and I have more than once dodged it as it came flying along the surface. There is a marked variation in color. I have seen them in a vestment of deepest blue; again a crimson, or a combination of both. The wings are often olive green in color, but I have seen them a deep scintillating blue, and often they are green splashed with spots of vivid blue, almost iridescent. The tail is sometimes tinted a pale violet. Such a radiant creature, flashing like a gem in the blazing sunlight, not one, but a dozen, or twenty dashing over the surface, appeals to observers in different ways. The layman who has never seen them before admires the brilliant display, the fish disappearing like some dazzling insect as it dashes through the air; and in nine cases out of ten the observer will be willing to take affidavit that the fish is flying, as the fins or wings appear to flutter; but the fact is that the flying gurnard is an animated aeroplane. It dashes out of the water at full speed, spreads its wings and soars, not flies, the rush through the air causing the weblike wings to flutter, giving the impression that the animal is moving by the beating of its wings.

The gurnard, at least so far as my observation goes, cannot fly as far as the California flying fish, which covers an eighth of a mile with ease, yet I have seen a gurnard sail out of sight, have seen it pass over a boat four or five feet from the water, and the fish is often blown aboard vessels, in several instances men being knocked down by it. In one instance known to me, a schooner was plying between some of the keys of the outer reef, but one man being on deck. The men below noticed that the vessel was up in the wind, and ran on deck to find their companion senseless from a wound between the eyes; a gurnard near by on the deck was the explanation. The head of the fish is a most formidable weapon of offense as a projectile, being as hard as a stone, and reaching backward from it are four long, sharp spines, which have all the appearance of barbs to this living arrow. The head is blunt, rising almost directly from the mouth, altogether giving the gurnard a pugnacious appearance.

In parts of the Barbadoes these fishes are highly esteemed, as one of the best of edible fishes. The natives down in the Caribbean Sea round up the flying gurnards of that region in great seines and take them by thousands. The sight is often of great interest, as when a school is found, and it is surrounded by the big net, the fliers go into the air by hundreds, presenting a most animated picture; the blacks shouting and laughing, and dodging the hard-headed fishes, which dash over the nets, sometimes hitting the natives. The net is either hauled upon the beach, or upon the various boats, which are filled to the brim with gorgeous fishes.

The flying gurnards, at least those observed by me, are surface fishes, preferring to live where they can leap into the air and soar away from their enemies. It is somewhat singular that inventors who are experimenting with airships do not study the flying fish, which is an ideal model, the most perfect soaring machine ever seen or likely to be seen. The pose of the flying fish in "soaring" is never pictured properly in books. Engravings usually show them parallel to the water, but they stand in their relation to the water at an angle of about forty-five degrees, the tail hanging down. When the speed is great the angle is more acute, and *vice versa*. If an airship could be built on the plan of the flying fish, it would be an instantaneous success.

Flying Lemur, a long-tailed animal resembling the lemur monkey in some respects. It is about twenty inches in total length. It is an animal of the tree-tops,

in the forests of the Indian archipelago. It lives inoffensively on fruit, insects, and birds' eggs. A loose fold of skin runs along each side of the body from the neck to the tail, with sufficient width to include the legs but yet leave the paws free. When the animal leaps it spreads its legs apart like a flying squirrel, and is able to soar with ease and perfect safety for almost any distance on a downward course. Also called the flying fox.

Flying Machine. See AIRSHIP.

Flying Squirrel, a squirrel-like animal provided with a loose fold of skin on each side of the body. When the animal leaps it spreads out its legs to their full extent, the fold which runs from fore leg to hind leg is stretched out like an airplane wing. As it nears the end of its flight it gives a graceful upward turn, partly to light head uppermost and partly to check its speed. Properly speaking, it cannot fly, but it can use its momentum to slide upward and can change its course. It is found in Europe, North America, and Asia.

Foch, fōsh, **Ferdinand** (1851), commander-in-chief of the forces of the Entente Allies. He inherited military instincts from his father and maternal grandfather, who were prominent in the First and Second Empires. In childhood he was steeped in family stories of the Napoleonic wars. In school he showed unusual intelligence. He liked sports and entered into them with a vivacity almost belligerent, but he was taught above all things self-control, absolute obedience to parental authority and to moral teaching. When the Franco-Prussian War was declared Foch was a student in Metz, preparing to enter the Polytechnique. He at once volunteered. The war over he returned to the school. One evening, at twilight, German cannon announced the signing of the hateful peace that marked the victory of the Prussians. The students were sad and silent. "My children," thus besought the old Jesuit father, "Pray for the future of France. Alsace and Lorraine are no longer ours." "We prayed," says Foch, "no, we did more than that, we made our vows. And now that we are at the evening of our life our prayers are heard and our vows are fulfilled."

Foch began his studies at the Polytechnique when France was in the throws of the Commune. He entered into them very seriously and afterward spent several years in training at military and cavalry schools. 1890 saw him a lieutenant-colonel and professor at the War School at Paris. In 1907 he bore the title of general and was president of the school which became renowned under his direction. During those dark days of the Great War, in March, 1918, it was Foch who accepted the role of Moses to the Allies and planned their way to victory.

During his many years as professor of military strategics he invariably impressed his pupils by his calm, firm, energetic manner of speaking and directing. He constantly assured his listeners that victory always comes to those who most deserve it, by reason of their greater intelligence and will-power. Also the idea possessed him that no one is defeated unless he consents to his defeat; that at the moment when defeat is most imminent, resourcefulness may save the day. This was illustrated by the flooding of the Yser between the enemy and his troops so that the German artillery was stuck in the mire, and the infantry were compelled to abandon their position.

August 21, 1918, the French president sent to General Foch the insignia of marshal, recalling the victories won under him.

Fog, a visible, watery vapor hanging near the surface of the earth. The word is Danish, meaning spray. There is no appreciable difference between a fog and a mist. Fog is caused by the condensation of moisture in the air into innumerable globules. A current of cold air, passing over warm water from which moisture is rising by evaporation, produces a fog. A current of moist, warm air from the sea, passing over cold land, produces the same result. If this condensation takes place near the surface of the earth we call the product a fog; if at some height, a cloud. Huxley states that a fog is a cloud resting on the earth; a cloud is a fog floating high in the air. As the atmosphere warms, and its capacity for absorbing moisture increases, fogs are dissolved and become invisible.

Cold currents from the Arctic Ocean, meeting the warm waters of the Gulf Stream southeast of Newfoundland, produce a region of perpetual fog and mist. To avoid collisions ships passing through this region keep their fog-horns going incessantly. A fog-horn used on shipboard is a huge cast iron affair, perhaps twenty feet in length. The dismal sound is caused by a blast of steam. At certain seasons of the year fogs are to be expected certainly in all North Atlantic ports, including those of the Great Lakes. They are so dense even at midday that a ship's pilot cannot see his way a boat's length in advance. Lighthouses do something to guide ships through the fog. They are also provided with fog signals that prove of assistance.

Great Britain and the coasts of Denmark are noted for heavy fogs, caused by the condensation of the moisture brought by the vapor-laden winds that accompany the warm Atlantic currents. The London fog is proverbially dense. When it falls on the city, street lamps are invisible at a distance of a few feet. Travel is positively dangerous. One may become lost in trying to go half a block. Business is suspended. Cabs stop running. Everyone makes for a place of shelter and waits until the fog lifts.

As we approached London the trees and houses became less and less visible on account of fog, and the nearer we came the denser it grew. It soon became impossible to see an object more than two or three arms length ahead of us. Detonators were placed on the tracks. The train would go until stopped by one of them, and wait a long time for a signal to start again. Then we would go on again at a snail's pace. So we continued until we reached Charing Cross Station.

I had always supposed that a London fog was much like an American fog except a little thicker, but such is not the case. You not only see it but you smell it, you taste it; the sounds you hear are muffled by it; like an evil spirit it follows you everywhere, even to your bedroom; and there it clouds your vision. In its appeal to the senses the London fog is like manual training—it is highly educative; it makes a deep impression upon you. Londoners have standardized fogs and numbered them as we used to number the degrees of hardness of rocks in the mineralogy class. The fog I saw was density No. 4 in a scale of five. I have no curiosity as to what No. 5 would be like. I saw enough London fog in three days to last a lifetime.—Charles A. Bennett.

Folk, Joseph Wingate (1869-), an American statesman. He was born at Brownsville, Tennessee, and is a graduate of Vanderbilt University. In 1890 he was admitted to the bar, and ten years later became circuit attorney for St. Louis. While in this position he prosecuted many cases of bribery and corruption, thereby gaining national fame. From 1905 to 1909 he was governor of Missouri.

Folk Lore, the lore of the common people. It includes traditions, customs, fairy tales, ballads, songs, accounts of ancient festivals, games, local superstitions and beliefs, weather proverbs, popular sayings and nicknames, nursery rhymes, riddles, and jingles of every sort. Interest in this branch of inquiry, and even the word itself, are of recent origin. The importance of folk lore as a means of studying social history, of tracing relationships between races, and investigating the origin of religious beliefs was not realized until the beginning of the nineteenth century. Many of the topics included under the subject may seem trivial to the student of weightier themes; but they are none the less fascinating. Poetry and fable were the topics that first attracted attention. Percy's *Reliques of Ancient English Poetry,* Scott's *Minstrelsy of the Scottish Border, The Children's Tales* of the brothers Grimm of Germany, Hans Christian Andersen's *Stories and Fables,* and the *Mother Goose* rhymes and nursery tales are collections of this sort.

The first important steps in the study of folk lore were taken in Germany. The Folk Lore Society of England, which remains the most important organization of the kind, was established in 1878. The association considers that it has begun its work all too late. The advent of the railway and the newspaper has broken up the hearthstone and village circles where traditions were handed down from generation to generation. The American Folk Lore Society was organized in 1888. It aims to collect information relative to the tales and traditions brought by the early settlers from the different nations. Also the dialects of the Negroes and the legends of the North American Indians.

Fond du Lac, Wis., the county seat of Fond du Lac Co., is situated on beautiful Lake Winnebago at the mouth of the Fond du Lac River, about 60 miles northwest of Milwaukee. Through Lake Winnebago and the Fox River there is water connection between the city and the Great Lakes. The city has important manufacturing interests, and is noted for its agricultural and dairy products. Other products of importance are lumber, flour, leather, refrigerators, furniture, sashes and doors, paper, shoes and wagons. Here are situated the Grafton Hall School for Girls, St. Agnes' Hospital, State Women's Reformatory and the Henry Boyle Catholic Home for the Aged. The population was 23,427 in 1920.

Fontainebleau, fon-tan-blō′, a village on the Seine, thirty-seven miles above Paris. As in the case of Versailles the village is unimportant. Interest centers in the royal palace of Fontainebleau and in the magnificent forest of the same name. In 1547 Francis I converted a medieval fortress into a chateau or palace, unrivaled in Europe for extent and magnificence. On account of its retirement, and the delightful forest surrounding it, the place was the favorite residence of French monarchs. This extensive pile of buildings contains five separate courts. The buildings are two stories in height. With the exception of several pavilions their exterior is not particularly imposing; but the interiors are decorated without regard to expense, in a style unsurpassed even in France.

The merest stroll through the vast hallways, picture galleries, halls, and suites of rooms is a day's task. The visitor is shown the room where Louis XIV signed the revocation of the Edict of Nantes in 1685, the hall in which the sentence of divorce was proclaimed against the Empress Josephine in 1809, and the court where Napoleon parted from the grenadiers of his old guard before his banishment to Elba in 1814. The mirrors and vases of Marie Antoinette, the bed and clock of Napoleon, the table on which he signed his abdication, together with many other objects of interest are pointed out. The preliminaries of the treaty of peace between Great Britain, France, Spain, and Portugal were arranged at Fontainebleau in 1762. A treaty, known as the Peace of Fontainebleau, was concluded here in 1785, between the French emperor and the Dutch.

The forest of Fontainebleau is about twelve miles in diameter and covers an area of 42,000 acres. It is the most beautiful forest in Europe. Springs, gorges, magnificent old trees, a cavern once the haunt of bandits, and rustic huts in which souvenirs of the forest are sold, are connected by walks and drives shaded by overarching trees. Foot paths intersect the forest in every direction. The wayfarer might wander through the forest for days without exhausting its resources. A number of picturesque villages find shelter around its borders. Among others, Barbison is noted as the residence of artists who delight in painting the scenes of Fontainebleau. It is to the credit of the French republic that the chateau and forest are well kept. The president of France lives here in the summer-time.

See VERSAILLES; PARIS; SEINE.

Food, any substance taken into the body to assist or nourish life. Foods may be classified as gaseous, liquid, and solid. Air is a gaseous food. The oxygen which it contains is absolutely essential to life. Death results from lack of oxygen. Viewed in this light, smothering or want of air is a speedy form of starvation.

The liquid necessary to life is water. In one sense of the word, water is not a food. It serves as a carrier. Particles of solid food are swept along in its currents through the arteries to all parts of the body. It also serves to render the various organs elastic. A muscle deprived of water becomes stiff and useless; a bone deprived of water becomes brittle—a mere white powder in fact.

Under solid foods, we must include the solid particles held in solution in coffee, tea, cocoa, milk, soup, and the like. Solid foods are classified usually as nitrogenous or tissue-making, non-nitrogenous or heat-making, and mineral foods. The nitrogenous foods are also called proteids. They form the muscles, bones, and other organs of the body. Milk, fish, eggs, meat, articles of food formed from flour and

meal, peas, and beans are the chief tissue builders. They yield the food needed for growth and strength.

The non-nitrogenous or heat-giving foods include the sugars, starches, fats, and oils. The first two are called carbo-hydrates, because they are compounds of carbon and water. Sugar and starch are found chiefly in the various vegetables, fruits, cereals, sugars, and gums. The fats and oils are obtained from both animal and vegetable sources, as butter, cream, the fat of meat, fish, cereals, nuts, and olives. The non-nitrogenous foods supply the heat and energy of the body. Pound for pound, the fats and oils supply twice as much heat as the carbo-hydrates. They also form the fatty tissues of the body. Fleshy people should avoid their use.

The principal minerals required by animals are lime, phosphorus, potassium, sulphur, sodium, magnesium, and iron. They are found in milk, oatmeal, beef, and many other articles of food. The only strictly mineral food in popular use is common salt.

Substances that destroy life instead of sustaining it are called poisons. Substances that produce nervous or muscular action without providing food material are called stimulants.

The make-up of our food is of importance. The proportion of the various elements yielded by some of our more common articles is shown in the following table. Waste refers to any portion that is not digested and utilized.

Substance	Waste	Water	Tissue	Fat and Fuel	Mineral
Sirloin steak	12.8	54.0	16.5	16.1	.9
Mutton	18.4	51.2	15.1	14.7	.8
Bacon	7.7	17.4	9.1	62.2	4.1
Turkey	22.7	42.4	16.1	18.4	.8
Fresh fish	....	80.7	10.1	7.1	2.1
Eggs	11.2	65.5	13.1	9.3	.9
Milk	....	87.0	3.3	9.0	.7
Cheese	....	36.0	28.4	31.1	4.5
Oatmeal	....	7.7	16.7	73.5	2.1
Corn meal	3.3	12.5	7.8	75.7	.8
White bread	....	35.3	9.2	54.4	1.1
Sugar	....	....	....	100.0	...
Green corn	....	75.4	3.1	20.8	.7
Potatoes	20.0	62.6	1.8	15.8	.8
Turnips	30.0	62.7	.9	5.8	.6
Apples	25.0	63.3	.3	11.1	.3
Strawberries	5.0	85.0	.9	7.6	.6
Hickory nuts	62.2	1.4	5.8	29.8	.8

The following allowance is considered a fair and well balanced ration for an average man at moderately muscular work:

Article.	Pounds.
Bread	.50
Butter	.12
Potatoes	.75
Cheese	.12
Beans	.12
Milk	2.00
Sugar	.20
Meat	.25
Oatmeal	.12
Total in pounds	4.38

In computing the amount of food needed by a family, authorities regard the food required by an ordinary man at moderate work as a unit. That is to say, starting with the food or ration of the foregoing table, as a unit, they consider that:

	Units.
Man at hard muscular work requires	1.2
Man at light muscular work, or boy 15-16 years old	0.9
Man at sedentary occupation, woman at moderately active work, boy 13-14, or girl 15-16 years old	0.8
Woman at light work, boy 12, or girl 13-14 years old	0.7
Boy 10-11, or girl 10-12 years old	0.6
Child 6-9 years old	0.5

According to the United States Department of Agriculture, every food may be put into one of five groups. Each of these groups serves a special purpose in nourishing the body. Some food from each group is needed regularly by the body. The groups are:

1. Vegetables and fruits.
2. Meat, fish, eggs, milk, cheese, soy beans and peanuts.
3. Cereal grains and their products.
4. Sweets—sugar, syrups, honey, jelly and candy.
5. Fats and fat foods—butter, cooking fats and table oils; suet, salt pork and bacon; nuts.

1. Vegetables and fruits furnish some of the material from which the body is made, and keep its many parts working smoothly. They help to prevent constipation.

2. Meat, fish, eggs, milk, cheese, soy beans and peanuts help to build up the growing body and renew used-up parts.

That is their main purpose though they also serve as fuel. Milk is important for children.

3. Cereals, and the flours, meals, breads, cakes, breakfast foods and other dishes made from them act as fuel for the work of the body, much as the gasoline burning in an automobile engine makes the car go. This is their chief purpose. Moreover they give the body some building material.

4. Sweets too are fuel. They also give flavor to other foods. They are valuable food, but many persons eat more of them than they need, and one could get along better without this group than without any of the others. Sweet fruits, especially dried ones like dates and raisins, contain much sugar and are better for the children than candy.

5. Fats. These furnish body-fuel in a concentrated form. Some are needed especially by hard-working people. Expensive fats are no better than cheap ones. Drippings from bacon and other left-over fats can well be used. Children need some butter fat.

The fuel value of food is measured in "calories," just as length is measured in inches. (See *Calorie*.) For convenience in meal-planning the hundred-calorie portion is often used. For instance, if a family consists of one man who does little muscular work; two women, one of whom does little muscular work, the other hard muscular work; an active boy 16 years of age, and three children 11, 8, and 4 years of age, they would require respectively about 200, 150, 200, 280, 140, 120, and 100 hundred-calorie portions a week, which make a total of about 1,200 hundred-calorie portions a week for the family. The diet will usually prove adequate and appetizing if the necessary calories of energy are supplied somewhat as follows: About one-fifth by fruits and vegetables; one-fifth by meat, milk, and similar foods; three-tenths by cereal foods; one-tenth by sugar and other sweets, and one-fifth by fats and fat foods.

During the war period, 1917-1918, food conservation was practised in the United States, under Federal and state food administrations. The campaign was carried out along three general lines: Reduction of consumption, stimulation of production, and control of prices. The results were highly satisfactory in securing the needed foodstuffs in the required amounts without general trouble or inconvenience, and the educational campaign carried out will bear fruit for many years to come. The United States learned as a nation, first, the real value of food; second, the folly, if not the sin, of wastefulness; and third, the economic balancing of the family ration. New methods of preserving foods, and the use of various substitutes, including cotton-seed oil, also resulted from war conditions.

Food experts generally agree that the average man requires each day an amount of food equal in heat value to about 3,000 calories; and this, expressed as mechanical energy, would be sufficient to lift one ton nearly a mile high. The amount depends upon the activity and kind of work done by the individual. The number of calories must also be furnished by a balanced ration, of which the most important item is protein. The American soldier was furnished during the war in Europe with a ration of 4,000 to 5,000 calories, though he could consume on an average only about 3,000. He was the best fed soldier in the war.

Before the opening of hostilities in the World War, the United States Government had made many experiments in food values. The result was the recommendation of a daily ration for the soldier in active service as follows:

Bread—1¼ lb., or biscuit 1 lb., or flour 1 lb.	
Meat—	
Fresh, if obtainable	1¼ Lb.
Preserved	1 "
Bacon	4 oz.
Meat extract (part of iron ration)	1 "
Cheese	3 "
Fresh vegetables, when available	8 "
Or peas, or beans, or potatoes, dried	2 "
Tea	⅝ oz.
Jam	4 "
Sugar	3 "
Salt	½ "
Mustard	1/20 oz.
Pepper	1/36 "
Limejuice	1/320 gal.
Rum	1/64 " *
*(At discretion of medical officer)	
Tobacco	2 oz. a week.

An important development was the establishing of the American Food Research Institute at Leland Stanford University. A grant of $7,000,000 was made by the Carnegie Corporation of New York for the support of this institute during the next ten years. An intensive study of problems connected with the production, distribution and consumption of food, in cooperation with existing food research agencies, is being planned.

The adulteration of food by mixing cheaper substances with the real article has become one of the crying evils of the day. Most states have passed pure food laws forbidding the manufacture or sale of impure food. State chemists are employed to test the articles of food offered for sale. One of the most common adulterations in that of milk with water. Butter is offered for sale containing lard, cheese, flour, chalk, excessive salt, gypsum, alum, glucose, cotton-seed oil, borax, and dyes. Cheese is adulterated with fats and potato flour; bread, with alum; flour, with cheaper meals; candy, with starch and sawdust. Coffee is ground up with peas, beans, tanbark, sawdust, and starch. Tea is mixed with the leaves of the basswood, sage, strawberry, and old tea grounds. Sugar refineries use glucose. Strained honey may be half syrup and sugar. Flour, potato, meal, sawdust, mutton tallow, and oil are sold in cocoa and chocolate. Mustard is reduced with flour and starch. Cheap jellies and jams are pretty sure to contain glucose, gelatine, and glue.

The difficulty of controlling interstate shipments of food supplies has led Congress to enact a pure food law. It is hoped that coöperation between national and state governments, together with rigid city inspection of milk and other articles of local production, may bar unfit food from the market.

See STARVATION; POISON; MEDICINE; WAGES.

Fool. See JESTER.

Fool's Gold. See PYRITES.

Foot, in measurement, the standard of length. The foot is the historic standard of length among the English-speaking people. The common foot of twelve inches is derived, no doubt, in name at least, from the length of the human foot. Nearly all civilized nations have a similar unit of length bearing a name of similar significance. The actual length of the foot, however, as a standard of measure, varies greatly. The Greek foot, or unit of length, supposed to represent the length of the foot of Hercules, is 12.14 English inches. The Macedonian foot is 14.08 inches. The foot of Sicily is 8.75 inches; the foot of Rome, 11.62; of Milan, 13.68; of Brussels, 10.86; of Geneva, the longest of all, 19.21 inches. According to measurements made by United States military authorities, the average length of the foot of the American soldier is 10.05 inches. During the reign of the English king, Henry I, a yard, popularly supposed to represent the length of his arm, was established as a standard. The foot was declared to be one-third of this standard yard.

Foot and Mouth Disease, a malady in animals corresponding in some measure to scarlet fever in human beings. It attacks not only cattle and hogs but sheep, goats, the deer family, horses, dogs, cats and even poultry. Human beings are not immune, the infection coming most often where children drink the milk of diseased animals. The disease prevails in European countries, and although the mortality is quite low, the loss is great, particularly to dairy herds.

The virus of the disease has not been isolated, being so small that it passes freely through the finest filters. Infection is rapid and the diesease usually makes its appearance in three to six days after exposure.

The symptoms of the disease are usually, first a chill which soon turns to high fever, often as high as 106°. In one or two days appear small vesicles on the tongue, cheeks, and lips with swelling about the feet. These soon develop into ulcers. Loss of appetite results. The internal organs may be attacked first, when death may result.

The duration of the disease ordinarily is from 10 to 20 days but with milch cows the flow of milk is seldom recovered before the following season. In malignant cases three months to a year are required for recovery. The mortality is generally from one to three per cent.

Prevention is the only satisfactory treatment and the best method of preventing the spread of the disease is by quarantine and destruction of infected animals.

An outbreak of the disease in 1902-03 in the United States was limited to the New England States by rigid quarantine. In 1914, a serious outbreak occurred in several parts of the country, which was met by prompt quarantine and by the closing and thorough disinfection of stockyards.

Football, a sport popular with college and other students, played chiefly in the fall. For the American game there are two opposing sides of eleven men each, who advance by various means an inflated oblong ball toward their opponents' goal. The authorized rules of the game, not given here because of annual changes, may be found in Spalding's Official Football Guide.

Historically, the main element was present in a Greek game. The game was played at Rome by opposing teams and was handed down to the Italians. A famous football field was in existence in a square at the end of the Church of Santa Croce, the Westminster Abbey of Florence. There were twenty-seven players on a side. Six judges, former players of renown, sat in a commanding position, three on each side of the field, to render decisions. Of the twenty-seven men, fifteen were runners, five interferers, four half-backs and three full-backs. The ball was kicked over a goal. The names of the Medicis and other noble families appear in the lists of players. In Germany, France, and England the bladder of the hog was much sought by children. When inflated and dried it made a juvenile football.

In 1314 Edward II issued a proclamation: "For as much as there is great noise in the city caused by hustling over large balls from which many evils might arise, which God forbid, we forbid such game to be used in the city in future." Various monarchs inveighed against football as tending to cause archery, of greater military value, to be neglected. In 1457 the Scottish James III decreed that "footballe and golfe be utterly cryed down and not to be used," while his successor, with equally uncertain spelling, gave orders that "In na place of this realme ther be used futeball, golfe, or other sik unprofitable sportes." James I of England declared football "meeter for lameing than making able the users thereof." Nevertheless the game was for centuries a favorite pastime throughout Great Britain. When it ceased to be a pastime for men at festivals and fairs it was kept alive by the boys of the public schools at Eton, Harrow, and charter house. It was a cherished game at Rugby. The Rugby game and Rugby rules were introduced into Canada and the United States. Harvard took up the game in 1875. The first American intercollegiate game was played between Harvard and Yale in 1876. Nine years later a football association was formed by Harvard, Yale, Princeton, Wesleyan, and the University of Pennsylvania. The evolution of American rules may be said to date from this time.

Foot Pound. See DYNE.

Foote, Andrew Hull (1806-1863), a distinguished American naval officer, was born at New Haven, Conn. In 1822 he entered the navy as acting midshipman, and received a lieutenancy in 1830. From 1837 to 1840 he was executive officer of the *John Adams*, of the East India squadron, and executive officer of the Boston Navy Yard from 1846 to 1848. From 1849 to 1851 he commanded the *Perry,* cruising the African coast to protect American commerce and suppress the slave trade. He was advanced to the rank of commodore in 1852. While in command of the China station during the war between China and England, Commodore Foote was fired upon by the Chinese. Upon their refusal to apologize, he attacked and captured four of their forts. In 1861, during the Civil War, Commodore Foote directed the naval attacks on Fort Henry and Donelson, and was severely wounded. He was detached from the western flotilla at his own request. In 1863 he was raised to the rank of Rear-Admiral, but died before he could assume his new command. He published a book, entitled *Africa and the American Flag*, dealing largely with his African cruise.

Foote, Arthur (1853-), an American composer, organist, and concert pianist.

Born at Salem, Mass., he studied piano and harmony with S. A. Emery, and also at Harvard University. After leaving the University, Mr. Foote studied organ and piano playing under B. J. Lang. Thus it will be seen why almost no foreign influence shows in his work. From 1878 to 1910 Mr. Foote was organist of the First Unitarian Church of Boston. He gained attention in 1883 with his *Trio in C Major,* for piano and strings. Mr. Foote composed works for orchestra, church music, chamber music, and a large number of songs. The best known are *Symphonic Prologue; Suite* in *E Major; Francesca da Rimini;* musical settings for a number of poems, such as *The Wreck of the Hesperus, and Hiawatha;* and, among songs, *O My Love's Like a Red, Red Rose, I Arise from Dreams of Thee* and *In Picardie.*

Foote, Mrs. Mary Hallock (1847-), an American novelist, a native of New York state. Her stories deal with mining life in Montana, and are more or less concerned with labor questions. *The Led Horse Claim, John Bodewin's Testimony, The Last Assembly Ball, Coeur d' Alène* and *The Prodigal* are among them. Mrs. Foote has written many magazine stories.

Foot-rot, a disease peculiar to sheep. The Scottish shepherd recognizes two varieties. The first arises simply from overgrown hoofs. It is prevalent among sheep that feed on soft, swampy ground. Moisture causes the hoofs to grow rapidly, and there is no grit to wear them off. The sheep become lame. A cure may be affected by trimming the hoofs and returning the sheep to stony or hard ground. Genuine footrot, however, is of an entirely different character. It is due to the lodgment of a microscopic growth, possibly an ulcer-causing bacterium, in the flesh between the hoofs. It is exceedingly contagious. A few animals afflicted with footrot infect an entire pasture, and in this way communicate the disease to a large flock. Afflicted animals should be kept by themselves. Various ointments may be applied to kill the germs. Sulphuric acid and oil of turpentine make an excellent caustic for the purpose. Footrot is not only exceedingly offensive, but it causes sheep to lose their hoofs and incapacitates them for grazing. See SHEEP.

Forbes, forbz, **Archibald** (1838-1900), a noted English journalist. He was born in Scotland and died at London. When a young man he served in the Royal Dragoons. In 1864 he joined the staff of the London *Daily News* as a war correspondent. He followed the progress of the German army during the Franco-Prussian War, making a reputation not only for the character of his correspondence, but his energy and ingenuity in getting his reports in from the field of battle. He was sent to India in 1874 to report the famine, and accompanied the Prince of Wales in the following year in a tour of that country. The Servian War of 1876, the war between Russia and Turkey in 1877, the revolution in Cyprus in 1878, the Afghanistan campaign of 1879, and operations in Zululand occupied a busy pen. He has written a number of works, the most noted of which is perhaps *Memories and Studies of War and Peace,* which appeared in 1896.

Forbes-Robertson, Sir Johnston (1853-), an English actor, was born in London, attained some success as a painter before he was twenty-one, and then gave up painting for the stage. Appearing in the company of Sir Henry Irving, he showed great promise and won notable success in company with Mrs. Patrick Campbell in the first production of *The Notorious Mrs. Ebbsmith.* In the same year, 1895, he became a London manager, opening with Mrs. Campbell in *Romeo and Juliet.* Later he played Othello and Hamlet, reaching the height of his dramatic power in the latter role. Sir Johnston began his farewell tour in 1912, but did not retire until 1914, after he had toured America. He was knighted in 1913. Sir Johnston was one of the world's greatest actors during almost all of his stage career.

Force, a term popularly misused, but which means, in physics, any agency which changes or tends to change the motion of a body, either by increasing or decreasing its velocity or by changing the direction of the motion. Nothing is known of force except as it produces these results. It is the immediate cause, therefore, of all phy-

sical phenomena, though it has no independent existence in the material world as does matter and energy. Force can be measured, then, only by its effects, by the change it produces in the motion of a body. The essential thing in a body is its mass, or amount of matter; and a change in the motion of a body is known as an acceleration. These then determine the value of a force, which is often defined as the product of the mass of the body by the acceleration produced in its motion by that force. A careful consideration of this definition will show that it may also be defined as time-rate of change of momentum or space-rate of change of energy.

The unit of force is that force which will produce in unit mass unit acceleration. In the English system it is known as a poundal and in the metric system as a dyne.

The force of attraction between two bodies varies directly as the product of their masses and inversely as the square of the distance between their centers. The best illustration of a constant force which we have always at hand is that of gravitation. The effect of such a constant force upon a freely falling body is to produce uniform acceleration.

See DYNAMICS; DYNE; POUNDAL; ENERGY; GRAVITATION.

Ford, Henry (1863-), an American inventor and the organizer and president of the Ford Motor Company, the largest automobile manufacturing company in the world. He was born at Greenfield, Michigan, and educated there in the public schools. He learned the machinist's trade in Detroit and about 1890 began to experiment with steam carriages. In 1895 Mr. Ford completed his first gasoline automobile. In 1903 he organized the Ford Motor Company. By standardizing and simplifying the output of the factories, the Ford Motor Company has reduced the cost of its automobiles, and has raised the production figures to about 3,500 automobiles a day. In 1914 Mr. Ford announced a profit-sharing plan involving the annual distribution to employes of between ten and twenty million dollars. At the same time the working day was reduced to eight hours and a minimum wage of $5 a day was provided for every employe over twenty-one years old.

Mr. Ford won much notoriety in 1915 when he organized a "peace party," chartered a ship at his own expense, and sailed for Scandinavia to enlist the aid of the neutral nations to end the World War. Illness forced Mr. Ford to return soon after the party reached Norway, but some of the members traveled through Norway, Sweden, and Denmark, and through Germany to The Hague. The United States government gave the party no recognition, and it could gain no official recognition elsewhere. The slogan of the organization was "We'll get the boys out of the trenches by Christmas." The American press heaped ridicule upon Ford and his associates and after a few weeks the "peace party" disbanded. Mr. Ford was mentioned as a possible Republican Presidential candidate in 1916, and in 1918 was Democratic candidate for the Senate against Truman H. Newberry. In 1917 he offered to turn over to the United States government the entire Ford plant, without profit, in the event of war with Germany.

Ford, Paul Leicester (1865-1902), an American author. He was born in Brooklyn, New York. His best known novel is *Janice Meredith,* one of the most popular of the historical novels which in the latter years of the nineteenth century marked the reaction from realism. *The Honorable Peter Stirling* is a novel of New York society. Other writings are *The True George Washington, The Story of an Untold Love.* Mr. Ford was the author also of a number of short stories and of pamphlets relating to American history.

Forest and Forest Service, Forests constitute one of the chief sources of a nation's wealth. As a source of supply for lumber and wood for its many uses the value of forests is obvious, but forests are valuable for other reasons not so obvious. Forests prevent rapid evaporation of soil water and so tend to equalize the flow of springs and streams. Moreover, rain falling in forested regions penetrates the soil instead of rushing down the slopes to the streams, often carrying a good part of the soil with it. Streams whose head waters

BOXWOOD

CORALWOOD

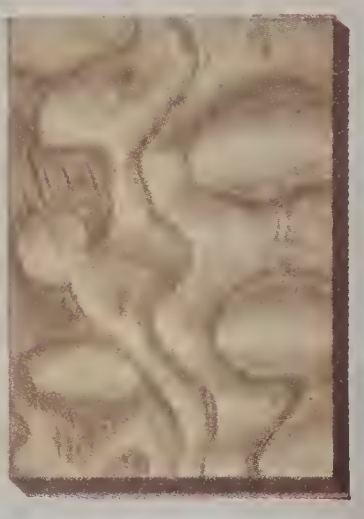
RED CEDAR

WALNUT

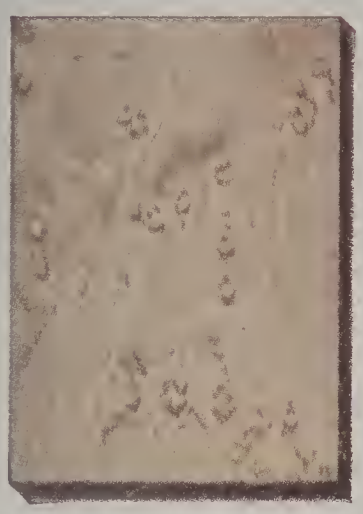
PURPLEWOOD

MAHOGANY

KINGWOOD



HUNGARIAN ASH



BIRD'S-EYE MAPLE

ROSEWOOD

OLIVEWOOD

VIOLETWOOD

ARBOR VITAE

SYCAMORE

SANDALWOOD

TULIPWOOD

POLISHED WOODS

are in deforested regions are characterized by high water during a period of rainfall and dry channels when the rainfall is light. Trees also afford protecting shade and shelter from wind.

For a long time European nations have realized the value of forests. They consequently enacted such laws as would maintain their forests while giving the inhabitants the privelege of supplying themselves with necessary lumber, fuel and other forest products.

Germany leads the world in the care and development of forests, whether under public or private ownership. Every forest in Germany is under the control of the State, and a government forester designates what trees may be felled, or how large a tract may be cleared, with the understanding that it immediately be planted with tree seeds or seedlings. German forestry dates from the time of Frederick the Great, and German forests are in an excellent state of preservation, although during all these years they have supplied the people's needs and been a constant source of revenue.

Other European countries have similar plans for preserving their forests and wherever the American tourist goes he finds in the "great woods" pleasure and surprise.

UNITED STATES. The forest area of the United States is about one-fourth the area of the entire country exclusive of Alaska. There are three great forest areas in the country—the eastern, the western and that around the Great Lakes. The eastern area extends from northern New England to the Gulf of Mexico and belongs to the Appalachian and Gulf regions. The western area lies west of the Rocky Mountains and extends northward from the Kern River Mountains in California into British Columbia.

The western parts of Washington and Oregon and the northwestern part of California are covered with the most dense forest in the United States. Here are found the Douglas fir, the sugar pine and the California redwood, all growing to an enormous size. This region is the chief center of the lumber industry. Farther south in California are the groves of big trees. The lake area covers the northern part of Michigan, Wisconsin and Minnesota. This was formerly the center of the white-pine lumber industry, but the supply of pine has been exhausted. Enough spruce, hemlock and hardwood are still found, however, to make lumbering profitable in some localities. The lumbering regions of the eastern area are chiefly confined to the southern and Gulf states where cypress and yellow pine abound.

The forest area of the United States, not including woodland and chapparral is 463,000,000 acres, which is a little over one-half the original area. The following table shows the forest areas of the respective states:

State	Acres
Alabama	20,000,000
Arizona	5,350,000
Arkansas	22,000,000
California	24,000,000
Colorado	8,700,000
Connecticut	1,500,000
Delaware	4,000,000
Florida	22,000,000
Georgia	21,000,000
Idaho	16,000,000
Illinois	5,100,000
Indiana	4,000,000
Iowa	2,500,000
Kansas	200,000
Kentucky	9,000,000
Louisiana	17,000,000
Maine	15,000,000
Maryland	2,228,000
Massachusetts	3,000,000
Michigan	19,000,000
Minnesota	22,000,000
Mississippi	17,000,000
Missouri	15,500,000
Montana	11,000,000
Nebraska	100,000
Nevada	480,000
New Hampshire	4,000,000
New Jersey	2,000,000
New Mexico	5,500,000
New York	12,000,000
North Carolina	18,000,000
North Dakota	00,000,000
Ohio	4,250,000
Oklahoma	5,500,000
Oregon	23,275,000
Pennsylvania	13,000,000
Rhode Island	250,000
South Carolina	10,500,000
South Dakota	820,000
Tennessee	13,000,000
Texas	12,400,000
Utah	3,600,000
Vermont	3,000,000
Virginia	14,000,000

Washington	17,550,000
West Virginia	8,500,000
Wisconsin	16,000,000
Wyoming	3,600,000

PRESERVATION OF FORESTS. The early settlers destroyed forests from necessity; later generations destroyed them from habit, and this wasteful practice continued without hindrance until the last decade of the nineteenth century.

The nation was gradually brought to realize that the forests were rapidly diminishing and that the time would soon come when the supply of forest products would not meet the demands of the country. In 1891 Congress authorized the President to set aside forest areas as "national reserves." There are now over 150 national forest reserves besides a number of state reserves. These reserves are under control of the national or state governments. Merchantable timber may be cut under supervision of the forester in charge but the old wasteful methods of lumbering are not allowed.

FORESTRY SERVICE. The Division of Forestry was created in 1880 under the Department of Agriculture, and in 1901 was organized as the Bureau of Forestry. In 1905 the Bureau was reorganized as the Forestry Service, which now has entire charge of the government forests. The Chief Forester, with an office in Washington, D. C., is at the head of the service. Other officers include foresters, assistant foresters, supervisors, rangers and guards. Excepting the guards, members of the service must be trained foresters.

For purposes of inspection the country is divided into sixteen tracts, each in charge of a forester. Each forester is aided by assistant foresters, rangers and guards. The guards are temporary employes, but the rangers are employed by the year. They patrol the forests, mark timber for cutting, extinguish and prevent forest fires, plant deforested areas with tree seeds or seedlings and advise owners of private forests upon request. The forester grants grazing privileges and sells timber and exercises general supervision over the forest under his charge.

The efficiency of the service has brought it rapidly into favor. Through its efforts forest fires have been almost entirely suppressed. Wanton desrtuction of forests has been stopped and the attempts of greedy corporations to gain control of public forests and water power privileges have been successfully resisted. The annual appropriations for the service are about $6,500,000, two-thirds of which is derived from leases of grazing lands and the sale of timber.

States are organizing forest services and in 1922 there were thirty-four such state organizations. These organizations cooperate with the Forestry Service.

FOREST PRODUCTS LABORATORY. In 1911 a forest products laboratory was organized at Madison, Wis., by the United States Forest Service in cooperation with the University of Wisconsin. The laboratory studies forest products and the best methods of their utilization. The expense of conducting the laboratory up to Jan. 1, 1921, was $2,000,000 and it is estimated that it has saved to industries at least $30,000,000 annually. The laboratory has made a total of over 500,000 tests on the mechanical properties of wood. During the war two-thirds of the force was engaged on problems relating to war work. A recent study of the effect of decayed wood on the quantity and quality of wood-pulp showed that there was at least a loss of $5,000,000 a year on storage pulp much of which could be avoided.

The great difficulty with forestry in America is the unwillingness of a democracy to wait fifty years for results. Then, too, our country is more subject to dry spells than is northern and central Europe. Forest fires are more apt to destroy our timber.

Father, thy hand
Hath rear'd these venerable columns, thou
Didst weave this verdant roof. Thou didst look
down
Upon the naked earth, and forthwith rose
All these fair ranks of trees. They, in thy sun
Budded, and shook their green leaves in thy
breeze,
And shot towards heaven. The century-living
crow,
Whose birth was in their tops, grew old and died
Among their branches, till, at last, they stood,
As now they stand, massy, and tall, and dark,

Fit shrine for humble worshipper to hold
Communion with his Maker. These dim vaults,
These winding aisles, of human pomp or pride
Report not. No fantastic carvings show
The boast of our vain race to change the form
Of thy fair works. This mighty oak—
By whose immovable stem I stand and seem
Almost annihilated—not a prince,
In all that proud old world beyond the deep,
E'er wore his crown as loftily as he
Wears the green coronal of leaves with which
Thy hand has graced him.

Bryant, *A Forest Hymn.*

Forge, an establishment for hammering and shaping metals with the help of heat. The term is also applied to the furnace used for such work. Iron, the metal chiefly handled, leaves the forge as wrought-iron; the product of foundries and blast furnaces is cast-iron. Forges are equipped with furnaces in which iron can be heated without melting it, and with huge steel hammers for shaping the metal. The furnaces of small forges, such as blacksmith shops, are equipped with bellows worked by hand; those of the large establishments have steam blowing machines. In the small forges the blacksmith works the heated metal into shape on an anvil; the large establishments the work is done by the steam hammer, some of which make over a thousand strokes a minute.

Forgery, in the criminal code, the making or altering, no matter how slightly, of a written instrument with the intention of deceiving. The most common forms of forgery are those in which the signatures to valuable documents or to checks are altered or counterfeited, or when the amount of a check is raised. In order to secure a conviction on a charge of forgery it is necessary to prove harmful intent; but it is not necessary that anyone be actually harmed. The states of the United States and the provinces of Canada provide varying penalties for this crime, usually fines or terms of imprisonment.

Forget-me-not, a genus of low, soft, hairy, flowering herbs. The botanical name, *Myosotis,* is Greek, meaning mouse-ear, in allusion to the short, soft leaves of some species. The common forget-me-not is a native of Europe and Asia. It belongs to the borage family which includes the puccoon, blueweed, bluebell, lungwurt, stickseed, hound's-tongue, and heliotrope. Like other members of the family the forget-me-nots have curled flowering stems which unroll as the flowers mature. The fruit consists of four smooth-angled nutlets. The common forget-me-not has small sky-blue flowers, with a yellow eye. A species from the Azores, much favored by the florist, has a deep indigo-blue flower with a whitish eye. The common name of the forget-me-not is much the same in the various languages of Europe. It is everywhere the emblem of friendship. In the language of flowers it stands for remembrance.

Silently, one by one, in the infinite meadows of Heaven,
Blossomed the lovely stars, the forget-me-nots of the angels. —Longfellow, *Evangeline.*

Fork, a well known table instrument. Hay forks and forks used by the cook in turning meat were known from an early date, but table forks are modern. "Fingers were made before forks" is a true proverb. Table forks were unknown to the ancients. Their invention is credited to the Italians, dating from about the time of the discovery of America. Henry VIII, his wives, and their predecessors ate with their fingers. At the end of each course basins and napkins were presented by attendants. Queen Elizabeth was the first English sovereign to become acquainted with the use of the table fork. Even in her reign the work was a curiosity. We learn that the Countess of Lincoln gave her "a knife and a spoune, and a forke of christall, garnished with golde sleightly, and sparcks of garnetts." The Countess of Warwick presented her with "one spoune and forke of golde; the forke garnished with two lyttle rubyes, two lyttle perles pendant, and a lyttle corall."

The following quotation is taken from the observations of an Englishman who traveled in Italy during the reign of James I:

I observed a custom in all those Italian cities and towns through which I passed, that is not used in any other country that I saw in my travels; neither do I think that any other nation of Christendom doth use it, but only Italy. The Italian and also most strangers do always at

their meals use a little forke when they cut their meate. For while with their knife, which they hold in one hand, they cut the meate out of the dish, they fasten the forke, which they hold in their other hand, upon the same dish; so that whatsoever he be that sitting in the company of others at meals, should unadvisedly touch the dish of meate with his fingers, from which all the table doe cut, he will give occasion of offence unto the company, as having transgressed the laws of good manners. This form of feeding, I understand, is generally used in all places of Italy; their forks being for the most part made of yron, steele, and some of silver, but these are used only by gentlemen.

For a century or two after the introduction of forks, a gentleman traveler carried his own fork, just as now-a-days he carries his razor or comb. Hotels were unsupplied with forks for general use. The first forks were two-tined. The three-tined forks were considered a great improvement. In this country, as well as abroad, silver for table forks began to take the place of steel about the time of the War of 1812.

Formalin, fôr′mȧ-lĭn, a liquid much used of late as a preservative and disinfectant. It is formed by dissolving forty per cent of formaldehyde in sixty per cent of water. The former is a compound of carbon, hydrogen, and oxygen. As indicated by the name, the active principle is much the same as that contained in the black juice or formic acid ejected by an ant. In a highly diluted form formalin is much used in museums as a preservative in which to bottle animal and vegetable specimens. A tablespoonful of concentrated formalin is sufficient for a quart jar of water. It has several advantages over alcohol. It costs less. Substances immersed in it are more apt to preserve their natural color. In a concentrated form it is less bulky and is better suited for carriage on scientific expeditions. As it kills most if not all bacteria, it is an excellent disinfectant. Physicians inject formalin into the veins of the arm as a remedy for certain forms of bacterial disease. The presence of formalin may be detected in the following manner: Place four tablespoonfuls of the sample in a teacup with an equal quantity of strong muriatic acid and a piece of iron alum about as large as a pin head. After mixing by means of a gentle rotary motion, place the cup in a pan of boiling water and let it stand for about two minutes. If formaldehyde is present the mixture will acquire a purple color.

Formaldehyde, the active principle of formalin, was discovered by A. W. Hoffmann in 1867. It is a compound of carbon, hydrogen and oxygen, and is considered to be the simplest of all the aldehydes. It is produced by oxidizing wood alcohol. Air saturated with the vapor of wood alcohol is passed over oxidized copper gauze inclosed in a large glass tube. Vapors of formaldehyde and water are formed, and when the water vapor condenses it dissolves a large portion of the formaldehyde vapor, forming an aqueous solution known as formalin.

Besides the uses mentioned, a compound formed by heating formaldehyde with carbolic acid (phenol) in the presence of a base is used as a substitute for hard rubber, celluloid, ivory, amber and other like materials.

Formosa, a large island in the Pacific, lying between the two China seas. It is about 200 miles directly north of the Philippines. It is separated from the Chinese mainland by a shallow strait ninety-one miles in width. The native name is "wooded mountain." It is 235 miles in length, with a breadth varying from 70 to 90 miles. The area is about 15,000 square miles. This island is traversed from the north to the south by a mountain chain, the highest known peak of which is over 14,000 feet in altitude. The mountains lie near the eastern shore. In places the eastern sea wall is a precipitous cliff rising from 3,000 to 7,000 feet sheer from the water's edge. Westward from the mountains the surface slopes away gradually in a fertile, sheltered plain to mud flats along the western shore.

This protected region has a climate not unlike that of Florida. The amount of rainfall is very great—over 100 inches annually. As might be expected the vegetation is luxuriant. Many of our hothouse plants, including some of our most beautiful orchids and lilies, grow wild in this region. There are dense jungles in which palms, azaleas, rhododendrons, tree ferns,

teak, pines, bamboos, bananas, and soap trees, the seeds of which may be used for soap, grow in profusion. Indigo, coffee, tobacco and tapioca are cultivated. It is said that there are nearly fifty species of insects not found elsewhere. Deer, monkeys, bears, panthers, wildcats, and other wild animals are still found in the jungles. Waterfowl are numerous.

The methods of tilling the soil resemble those in vogue in China. Sugar, tea, indigo, jute, hemp, oil, and rattan are important articles of export. The largest known camphor forests in the world are found here. The annual output of camphor is not far from 7,000,000 pounds. The population is estimated at 3,000,000. It consists chiefly of Chinese and Japanese. An aboriginal race inhabits the mountain range. It is thought to be of Malay origin. At all events, the men are fierce fighters and carry on an unceasing warfare with the inhabitants of the lowlands, much as the Apaches and Comanches of the West harassed the white settlers.

The island belonged to the Chinese from time immemorial; but was seized by the Japanese in the War of 1895. The Japanese government has made the purchase of camphor a government monopoly. The world at large buys camphor at the price fixed by the government. Formosa was at one time a noted place of refuge for Malay pirates, but under Japanese management, good order has been established, and the inhabitants are making substantial progress in agriculture, lumbering, and mining.

See CAMPHOR; JAPAN.

Forrest, Edwin (1806-1872), a celebrated American actor. His first notable success was in the character of Othello, which he played in New York in 1826. The parts in which he achieved marked success were those of Othello, Macbeth, King Lear, Coriolanus, Virginius, Spartacus, and Tell. Forrest was popular in England, as well as in the United States, until in 1845, when in London he was hissed while playing the part of Macbeth. He believed this to be due to Macready's influence. Forrest and Macready had been warm friends, but now Forrest accused Macready of trying to injure his reputation from motives of professional jealousy. When Macready was playing Hamlet in Edinburgh, Forrest stood in his box and hissed loudly. The quarrel continued and in 1849 while Macready was playing in the Astor Place Theater in New York a riot occurred, caused by the different partisans of the two actors. Several lives were lost at this time. Forrest retired from the stage from 1853 to 1860. Returning he played Hamlet with great success. He made his last appearance on the stage in 1871. Forrest left a large fortune. His house in Philadelphia was left as a home for aged actors. See MACREADY.

Forrest, Nathan Bedford (1821-1877), a Confederate general. He was born at Chapel Hill, Tennessee. When the Civil War broke out he gathered a regiment of cavalry, and was made commander of Fort Donelson on the Cumberland. He played an active part at Shiloh, Chattanooga, and at Murfreesboro where he was made brigadier-general and chief in command, Parker's Crossroads, Chickamauga, and Fort Pillow. He was promoted to the rank of lieutenant-general in 1865, and in the same year surrendered his command at Gainesville. Before the war he had been a real-estate broker and slave-dealer in Mississippi; afterward he became president of a southern railroad.

Fort, a military stronghold. It seems natural for man to shelter himself behind a tree, a rock, a heap of earth, or something of the sort as a means of protection when attacked. In time of danger the Roman legion threw up an earthen wall around a rectangle wherever it encamped even for a night. The early settlers of America protected themselves by stockades consisting of log houses and of timbers planted closely together in a ditch. Either log or sod forts were in general use. Fort Sumter was constructed of brick. Old Fort Moultrie was built of palmetto logs.

Much study has been given to the subject of fortifications. It has been found that a pile of sand is the best known stop for a cannon ball. In a recent test at the Woolwich arsenal near London, bolts weighing as high as 1,300 pounds, and charges of powder up to 300 pounds, were used. The guns were discharged into a bank of sand.

The results were measured with care. One of the heaviest bolts bored along through the sand like a mole at a distance of about five feet below the surface, and yet it penetrated but forty-seven feet.

The United States government has built a system of coast defenses at great expense. Not to mention minor forts, twenty-seven first-class defenses extend along the Atlantic coast from Fort Foster in Portsmouth harbor, Maine, to Key West, off the southern extremity of Florida. Six are situated on the Gulf of Mexico and eight on the Pacific coast. The typical defense is a broad, low mound of sand. The interior is constructed of masonry, perhaps thirty feet thick. The outside presents the aspect of a low hill covered with greensward or shrubbery so as to attract no particular attention from warships at sea. As a further measure of concealment, smokeless powder is used. These forts are defended by enormous rifles, the largest of which throw a twelve-inch bolt. A gun of this sort is forty feet in length and weighs over 100,000 pounds. It requires a charge of about 500 pounds of powder and throws its bolts to a distance of nine miles. The total cost of such a gun, including its carriage and the concrete base on which it stands, is not far from $150,000. The exact number and size of guns in any particular fort is not made public; but it is known that Fort Warren in Boston harbor has an armament of about thirty. Most of the great guns are mounted on a mechanism known as a disappearing carriage, by means of which the rifle is raised up into position. After it has been discharged it sinks back again into a place of safety behind its earthen wall. When guns are mounted in an elevated position, they are protected by revolving steel turrets with conical roofs.

Previous to the Great War, all civilized nations had spent countless millions of dollars in erecting fortifications of stone, steel and cement, believing such structures to be impregnable. The bombardment of Liege, Belgium, by the Germans, however, soon demonstrated that these fortifications could not withstand the assaults of modern artillery. The elaborate system of trenches used in this war proved to be the more successful, and the concrete and steel dugouts were proof against any gun fire. See BLOCKHOUSE; VAUBAN.

Fort Duquesene. See BRADDOCK, EDWARD.

Fort Madison, Iowa, is finely situated on the Mississippi River, 20 miles south of Burlington. It is the county seat of Lee County. It is served by the Chicago, Burlington & Quincy and the Atchison, Topeka & Santa Fe railroads, the latter of which has repair shops here. Manufactures of importance include buttons, boots and shoes, boxes, furniture, canned goods, wrapping paper, fountain pens and bricks. The state prison is located here. A fort was erected here in 1808, but it was abandoned when the city was established in 1832. The city contains the Cattermole Memorial Library, good public schools and several parks. Population, 1920, 12,066.

Fort Mims, Massacre of, an Indian massacre that occurred in 1813, during the Creek War, when all but fifteen of 553 people sheltered in the temporary stockade known as Fort Mims, 35 miles north of Mobile, Alabama, were surprised and killed by the Indians. The attacking force greatly outnumbered the defenders, who made vigorous but unsuccessful resistance.

Fort Monroe, the United States military post situated at Old Point Comfort, Virginia, and commanding Hampton Roads, is the headquarters of the coast defenses of Chesapeake Bay. The fortress stands on a reservation with an area of 282 acres, which is also the site of the United States Postgraduate Artillery School. The land was ceded to the Federal government in 1818.

Fort Moultrie, formerly Fort Sullivan, is on Sullivan's Island, at the entrance to Charleston Harbor, South Carolina. It is well known for its defense against the British during the War of the Revolution, when, in 1776, a British force under Sir Henry Clinton on land, and a fleet under Sir Peter Parker, attacked the fort, but were driven off by the force of about 6,500 under Colonel Moultrie. Attacked by the British again in 1780, the defenders were forced to surrender. During the Civil War, Fort Moultrie fell into Confederate hands

through Major Anderson's abandoning it for Fort Sumter.

Fort Niagara, a fort that stood at the mouth of the Niagara River, on the American side, form 1725 to 1826, when it was abandoned. As early as 1669 a house was built here by La Salle, who erected a fortified trading post on the site in 1679. Vaudreuil built Fort Niagara in 1725, and soon it became the chief military and trading post on the Great Lakes. The British under Sir William Johnson took the fort in 1759, but it was returned to the Americans thirty-seven years later. Captured by the British again in 1813, it was returned to the Americans at the close of the War of 1812. After its abandonment in 1826. Fort Niagara was demolished.

Fort Scott, Kansas, the county seat of Bourbon County, is a mining and manufacturing city situated on the Marmaton River, 100 miles south of Kansas City. Mineral deposits near the city comprise coal, zinc, lead, flagstone and clay. Some oil and gas is also found. Manufactures include cement, bricks, pottery, tile and harness. Fort Scott is the largest horse and mule market in the state. The city was first settled in 1844, as a military post, and was chartered as a city in 1882. It contains the Goodlander Home for Children, the old government fort buildings, a national cemetery and a natural public park of 160 acres. Population, in 1920, 10,693.

Fort Smith, a city in western Arkansas on the Arkansas River. Seven railroads enter the city and it has a thriving commerce, besides numerous manufactories, among them iron foundries, furniture factories, sawmills, and cottonseed-oil mills. The wholesale trade in household goods, groceries, and meats is important. A United States military reservation was formerly there, and the city is the seat of the United States district court for the western district of Arkansas. The population in 1920 was 28,811.

Fort Wayne, an important railroad center in the northeastern part of Indiana at the head of the Maumee River. The third city of the state in population, in 1920 it had 86,549 people. Various thriving manufactories are located there, among them knitting mills, machine shops, including a large car-wheel factory, glove and waist factories, farm implements and electrical supply factories, engine works, hosiery, clothing, baking powder, wagons, etc. In 1794 "Mad Anthony Wayne" located a government post on the site of the city.

Fort William, Ontario, is situated on Thunder Bay, Lake Superior. The bay affords one of the most commodious harbors on the Great Lakes, and Fort William, and the twin city Port Arthur, three miles to the north, form the chief reshipping port for produce leaving and entering western Canada. Practically all the grain exported from Alberta, Saskatchewan and Manitoba is transferred from trains to ships here. The grain elevators of the two cities had in 1923 a capacity exceeding 65,000,000 bushels. Fort William is 180 miles northeast of Duluth and 419 miles southeast of Winnipeg. Montreal is 992 miles southeast by rail. The city is on the main lines of the Canadian Pacific and the Canadian National railways and is a port of call for passenger and freight steamers on the upper lakes. Transhipment of grain is the leading industry. Following this in order of their importance are flour mills, the manufacture of stoves, car wheels and other foundry products, ship building, and the production of building supplies.

The postoffice, city hall, grain exchange and public library are the noteworthy public buildings. The city has the usual number of good business blocks and several parks whose combined area is 125 acres. The surrounding country has an ample supply of timber and a soil in which all crops of a cool climate thrive. Numerous streams furnish water power for manufacturing. Iron, gold and silver are in the immediate neighborhood.

Fort William began as a Hudson's Bay trading post in 1805. It was incorporated as a city in 1907. Its recent development is due to the completion of the Canadian transcontinental railways. Population, 1921, 20,541.

Fort Worth, a rapidly growing city in northern Texas. It is the county seat of Tarrant County, and is on the Trinity River. The surrounding country produces

much cotton, grain, and fruit, for which Fort Worth is the distributing center. Located there are grain elevators, flour mills, a cracker factory, great horse and mule markets, a jute factory, rolling mills, cotton and woolen factories, tanneries, railroad shops, a packing house, etc. From a population of less than 1,000 in 1876, it has grown to a city of 106,482 people in 1920. There are several academies and colleges, and fine public buildings.

Fortification. See FORT.

Forty Thieves, The. See ALI BABA.

Forum, a Latin word meaning an open place. It corresponds to the Greek *agora* and to the English marketplace. The most celebrated forum is that of ancient Rome. It was originally a marshy valley lying between the principal hills of the city. When the era of city improvement arrived, it was leveled off and drained into the Tiber by an underground arched sewer known as the Cloaca Maxima. The Forum proper occupied between four and five acres. It was bounded by four straight lines. It had the shape of the lower half of a slender letter "A." It was several times as long as wide. The early tribes met here to consider public business. Questions of life and death, of peace and war, were determined here.

The Roman Forum is probably the most celebrated open air place of meeting in the world. As Rome was the center of civilization, the Forum was the business, religious, and political center of the city. Political issues that make up the history of Rome were decided here. The tumultuous elections of which we read were carried on in the Forum. Mark Antony delivered his famous oration over the dead body of Caesar here. Cleopatra, the famous queen of Egypt committed suicide rather than be led in triumph through the Roman Forum. In the bloody days of the Triumvirates, the heads of political enemies were displayed from the *rostra*.

According to the historians the Forum suffered little from the invasion of the Goths and other modern tribes. In fact its buildings stood intact until the time of the civil wars that followed the disintegration of Charlemagne's empire. The site of the Forum then became covered with a mass of ruins and rubbish over which goats strayed and browsed. During the latter half of the nineteenth century extensive excavations were undertaken, so that the visitor may now have some adequate idea of the Forum as it once existed.

See ROME.

> In yon field below,
> A thousand years of silenced factions sleep—
> The Forum, where the immortal accents glow,
> And still the eloquent air breathes—burns with Cicero!
> —Byron, *Childe Harold.*

Fossils, the ancient remains of plants and animals imbedded in the earth's crust. The term is Latin, signifying dug out. The earliest rocks contain no fossils, but, generally speaking, fossil remains are to be expected in all stratified rocks. Fossil spiders and other insects have been found preserved in amber washed ashore on the Baltic coast. Sometimes a fossil is a mere imprint. The sandstones of the Connecticut Valley have preserved the tracks of reptiles, made, no doubt, when these rocks were beaches of loose sand washed by the tide. Many coal measures contain beautiful imprints of ferns and rushes, of which nothing else remains. Not infrequently the matter of which a shellfish or other animal consisted has entirely disappeared, leaving a fossil chamber, or cavity, especially in a limestone rock, of the exact shape and size, forming a perfect mold of the object. Sometimes infiltrating material fills the space, forming an equally perfect cast. Sometimes the material of which an animal or plant consisted has been replaced, perhaps by silica. Such fossils are known especially as petrifications, that is to say, the original plant or animal has been replaced by stone. Near Cairo, Egypt, and Holbrook, Arizona, entire fossil forests have been found. Sometimes the original substances, especially shells and bones, have been preserved almost unchanged. The hunters of northern Siberia have found the tusks of the mammoth encased in frozen mud. This fossil ivory has been preserved for ages unchanged, and is found in sufficient quantities to be of commercial importance.

Geologists depend upon fossils largely to determine the relative age of rocks. Prolonged and careful study has deter-

Underjaw of phascolotherium.

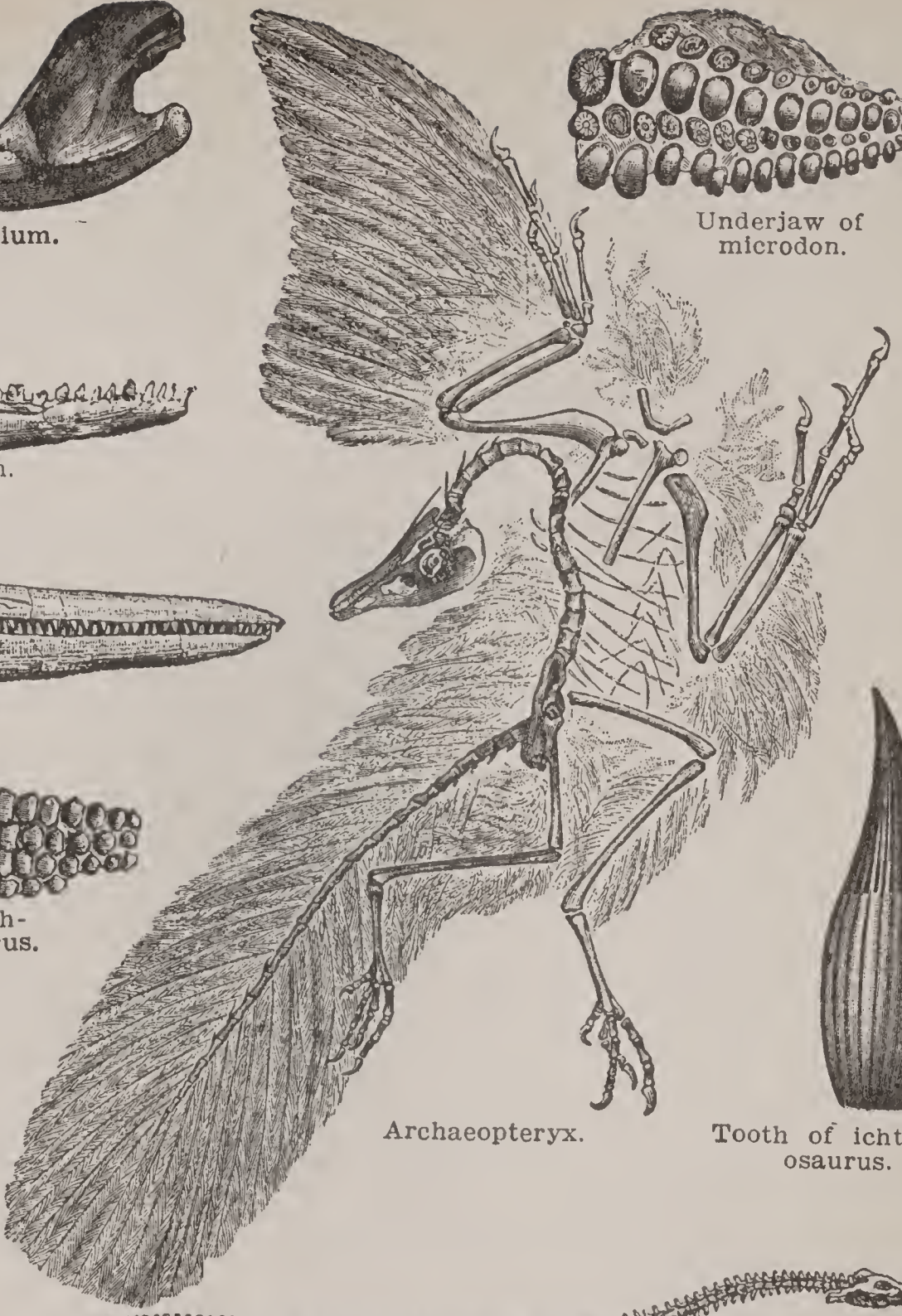
Underjaw of amphitherium.

Bill of ichthyosaurus.

Coprolith of ichthyosaurus.

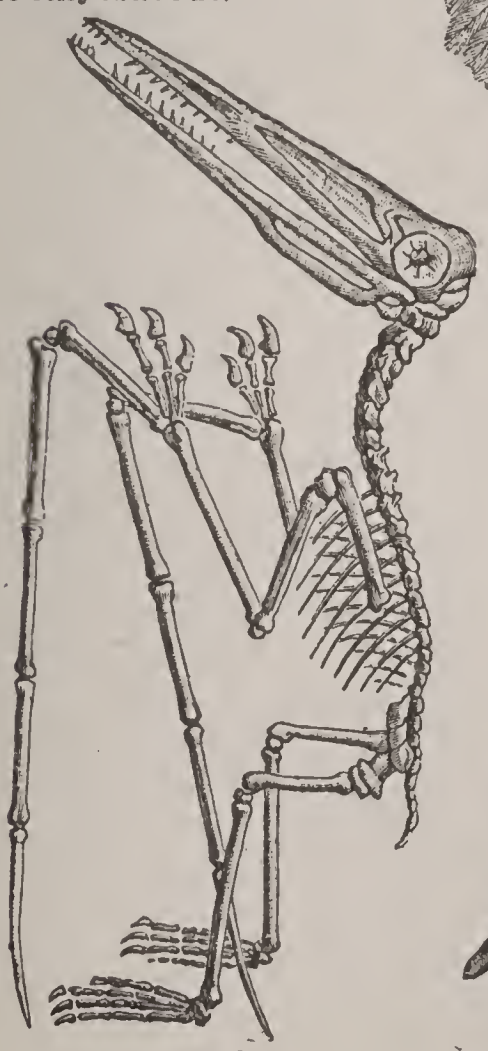
Fin of ichthyosaurus.

Underjaw of microdon.

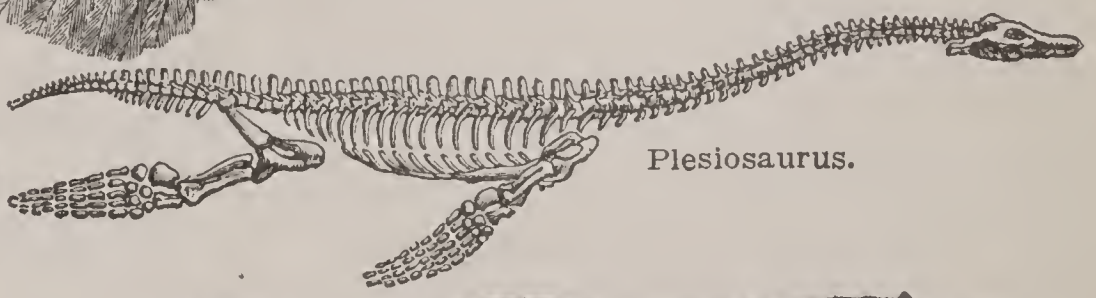


Archaeopteryx.

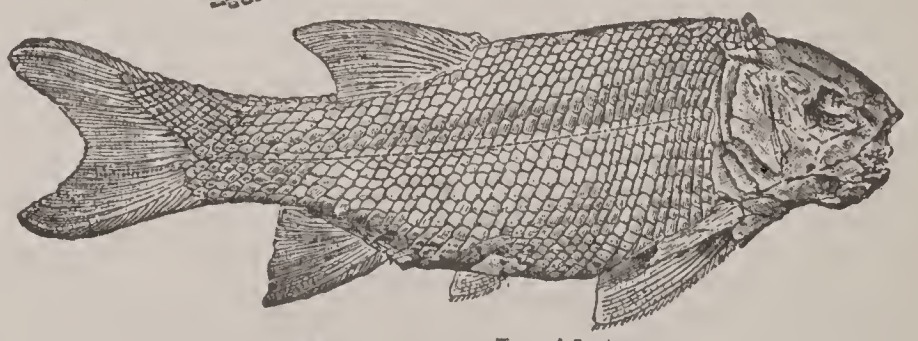
Tooth of ichthyosaurus.



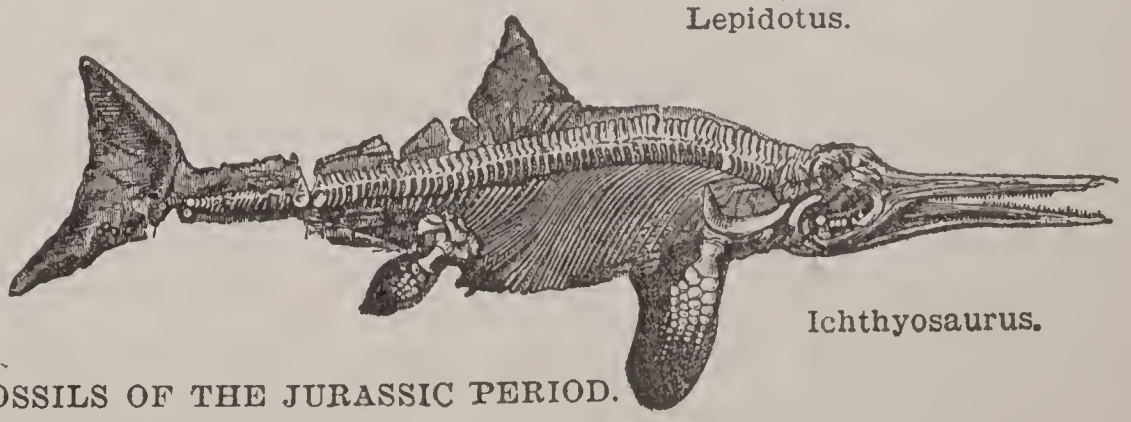
Pterodactyl.



Plesiosaurus.



Lepidotus.



Ichthyosaurus.

FOSSILS OF THE JURASSIC PERIOD.

mined in what order the various plants and animals appeared on the face of the globe. When fossils of a certain kind are found in strata of rock, however widely separated or different in position, the student argues that the rocks belong to the same geologic age. In mountain making, layers of rock are wrinkled not infrequently like a piece of cloth. Great folds thus formed may fall over, so that the stratum which is on top in one place is found beneath elsewhere. A careful study of the fossils puts the geologist on his guard. The history of a rock formation may be read often by means of its fossils. When a rock, as in the case of many limestones, is composed largely of seashells, the geologist concludes that it must at some time have been the floor of a sea, even though it lie on the slope of a mountain at the present time.

Fossils were long objects of wonder and of superstition. Even the learned regarded them as of miraculous origin. Among scientists who gave the public information may be mentioned the celebrated naturalist Cuvier, who studied the fossils in the gypsum beds near Paris; Hugh Miller, who studied the fossils of Scotland; Buckland and Lyell, and the English geologist, Richard Owen, long the most eminent scholar in this field of investigation. In the United States, the regions of the Badlands in the West are especially celebrated for remarkable fossil remains. Professor Marsh found the skeletons of birds with teeth, a four-toed horse, flying serpents, sea serpents, and many other wonders. The University of Yale has one of the greatest known collections of fossils.

The popular notions once held are expressed in Scott's *Marmion*. Whitby's nuns tell each other the bits of local lore:

> And how, of thousand snakes, each one
> Was changed into a coil of stone
> When Holy Hilda prayed;
> Themselves, within their holy bound,
> Their stony folds had often found.

Foster, Sir George Eulas (1847-), a noted Canadian statesman, one of the finest debaters and speakers the Canadian House of Commons has ever known. He was born in Carleton County, N. B., was graduated in 1868 from the University of New Brunswick, and subsequently studied at Edinburgh and Heidelberg universities. During 1872-79 Sir George was professor of history and classics at the University of New Brunswick. In 1882 he was elected to the Canadian Parliament. In 1885-88 he was Minister of Marine and Fisheries; Minister of Finance in 1888-96; and was leader of the House in 1895-96. Sir George adhered to the Liberal Conservative party and firmly advocated adequate protection for Canadian industries and the development of Canada through improved transportation facilities. In 1912 he was a member of the Dominions Royal Commission. He represented Britain at the Economic Conference at Paris in 1916, and at the first assembly of the League of Nations at Geneva in 1921.

Foster, John Watson (1836-1917), an American diplomat and author, was born in Pike County, Ind. Graduating from the Indiana State University in 1885, Mr. Foster was admitted to the bar in 1857. He entered the Union army at the opening of the Civil War as major of volunteers, later attaining the rank of colonel. Between 1873 and 1883 Mr. Foster was successively minister to Mexico, Russia and Spain. In 1892 he was Secretary of State in President Benjamin Harrison's cabinet, and in the next year was agent of the United States in the Bering Sea arbitration at Paris. In 1898 he was a member of the Anglo-American Joint High Commission to settle disputes between the United States and Canada; in 1903, agent of the United States in the Alaskan Boundary Commission; and in 1907 was delegate from China to the Second Hague Conference. Mr. Foster served honorably and ably throughout his entire diplomatic career. His published writings include *A century of American Diplomacy, American Diplomacy in the Orient, Arbitration and The Hague Court.*

Foster, Stephen Collins (1826-1864), an American song composer, whose songs *My Old Kentucky Home, The Old Folks at Home* (*Suwanee River*), *and Massa's in the Cold, Cold Ground* almost have the status of American folk songs. The composer was born at Lawrenceville, Pa. His

musical gift was natural, and at a very early age he taught himself the flageolet. When his songs began to appear, Mr. Foster became very popular, though he seems not to have cared either for money or fame. *My Old Kentucky Home* is, after *Home, Sweet Home,* the world's most widely translated song. All Europe and even Asia and Africa have versions of it. Mr. Foster received no formal training in his art, and while his 125 or more songs are technically simple, they are always graceful in melody. Although he was a native of the North, Mr. Foster's negro ballads are the compositions upon which his fame chiefly rests. He wrote *Old Uncle Ned, Nelly Bly, Come Where My Love Lies Dreaming, Louisiana Belle* and *Way Down South Where de Cotton Grows.*

Foster was extravagant in money matters, and despite the enormous sales of his songs he was always in need and was obliged to sell his songs for a small sum.

Foucault, Jean Bernard Leon (1819-1868), an eminent French physicist who in 1851 demonstrated with an oscillating pendulum the rotation of the earth on its axis, and who with Fizeau was the first to make direct measurement of the velocity of light in different mediums. He was born at Paris and educated for the medical profession. In 1850 M. Foucault proved that the velocity of light was greater in air than in water. He is credited with the invention of the gyroscope in 1852. In 1855 he was appointed physicist at the Paris Observatory, and in 1857 invented the polarizing prism that bears his name. In 1859 he completed the great reflector in the telescope of the Paris Observatory, and later made discoveries that improved the electric lighting system of his day. His discoveries in photography and in the use of the telescope have proved invaluable. M. Foucault was made an officer of the Legion of Honor in 1864.

Foulard, fo͞o-lärd′, a thin, soft, printed dress silk, plain woven, or twilled and finished with considerable luster. It is used for summer gowns. There is variety of color design, but white on a blue ground is the most common style of coloring. Foulard is popular at intervals, and again it is out of fashion for years at a time. Foulard was imported originally from India, but is now made in this country. Cotton foulard is a close imitation in design, coloring, and finish of this silk.

Foundry. See CASTING.

Fountain of Youth, The. See PONCE DE LEON.

Fouqué, fo͞o-kā′, **Friedrich Heinrich Karl,** Baron de la Motte (1777-1843), a German poet and novelist. He was the grandson of Heinrich August Fouqué, Baron de la Motte, a Prussian general whose published correspondence with Frederick the Great is of interest. The "Younger Fouqué" served as lieutenant in the campaign of 1792. He is the author of many poems, but his short stories have won him fame. The best known of these is *Undine.* This story has been translated into every European language. It was founded on a tale told by Paracelsus in his *Treatise on Elemental Sprites.* Undine is a beautiful water spirit who, according to the laws of her race, can win a soul only by wedding a mortal. Should her husband prove untrue, she is forced to destroy him. Fouqué's tale is told simply, but it is full of a dreamy beauty and weird charm which will ever make it a favorite.

Fourier, fo͞o-rĕ-ā′, **Charles** (1772-1837), a French reformer. He was educated for a commercial life, and with the exception of military service during the period of the French Revolution, he spent the greater part of his days in various subordinate mercantile positions. While yet but nineteen he was employed in a mercantile house at Marseilles. In order to hold up prices the manager withheld a cargo of rice from the market until it spoiled. He then directed Fourier to throw it overboard. At the same time thousands of French were starving for food. The waste of competition and the great expense of keeping rival salesmen in the same territory became impressed upon the young clerk's mind. Writing in the early years of the nineteenth century he stated that 3,000 grocers were employed in supplying the city of Paris, when 300 could do it better, and that 1,000 traveling salesmen were canvassing the trade of the city less satisfactorily than 20 men

could do the work if they had a monopoly of the business. On the other hand, he found a vast amount of poverty—a large number of people unable to pay the prices of an expensive system of supply. Fourier's proposed remedy for all this evil was the organization of society into phalanxes. Each phalanx was to produce as nearly as possible all articles of food, clothing, and other necessities needed by its own numbers, and was to distribute these articles through a storehouse of its own, thus cutting out all merchants and carriers. With a management to set each person at work producing just what was likely to be needed, everyone would have employment; and, as all articles were to be put into the storehouses at cost, all would be fed and clothed and sheltered at little expense, and a large part of the world's worry and misery and hunger would be avoided. According to this plan there could be no wealthy people, and none were to be permitted to suffer for want of ordinary supplies. Fourierism, as his plan is called, is not exactly socialism, but it is a form of it. About 1840 these ideas began to take root in the United States. The famous Brook Farm undertook to put them into effect. Two papers, the *Phalanx* and the *Harbinger,* were established to spread Fourierism. A society or association for the support of the new doctrines was organized with no less a man than Horace Greeley at its head. About thirty-four phalanxes were organized. The strongest were the North American and the Wisconsin. The movement died out about 1850. The study of Fourierism is an interesting introduction to that of state ownership and communism. See BROOK FARM; SOCIALISM; COMMUNISM.

Four-o'clock, a well known garden flower. It is known to botanists as *Mirabilis,* meaning wonderful. The popular name of four-o'clock has reference to the late hour in the day at which the flowers open. It was introduced from tropical America, and is known sometimes as Marvel of Peru. There are several species. The common four-o'clock is an erect, bushy, quick-growing herb from two to three feet high. It blossoms profusely in autumn. The flower has no corolla; but the calyx, which is tubular and salver-formed, has the color and fine texture of a corolla. In its native clime, and in the southern part of the United States, the four-o'clock produces tubers that may be stored like those of the dahlia. The northern florist depends entirely on seed.

Fowl. See CHICKEN.

Fox, a well known animal of the dog family. The fox is smaller than the wolf. It has a sharper muzzle. Its ears are more pointed. It is more agile and alert, and steps more lightly. It is also provided with a large, bushy tail which it takes great pains to keep dry and clean. When it lies down to sleep this tail is carefully disposed like a fur blanket over its feet and nose. There are several species. The small arctic fox is of a blue gray in summer and pure white in winter. The silver fox has a beautiful silver gray pelt, for which trappers expect $50. The yellowish gray kit or swift fox of North America is found from Iowa northwestward. The fox of fable and history, the one that did not want sour grapes, is the common red fox of Europe and North America, although there are many varieties. It is an animal of proverbial cunning and sagacity.

Foxhunting is a favorite sport in England. A "meet" is quite a social event. Ladies and gentlemen appear at the appointed place mounted on their best horses. The foxhounds are brought to the field in leashes and are loosed in some thicket where foxes are supposed to have concealed themselves. When a fox is started the hounds follow the scent at full cry; the members of the party ride after at full speed vying with each other in their ability to take hedges, fences, and ditches. A fox generally leads off across country, but after a long time is pretty sure to return to its place of starting. It resorts to a great many devices, such as doubling back on its former track, leaping great ditches, walking fences, climbing the top of a stump and from there to a tree; but the hounds are usually too much for any but an experienced old fox. Unless it takes to its den, which it seems to have a strong disinclination to do, they usually succeed in overtaking it. The sportsman who is first up claims the bushy tail or brush as a

trophy. An account of a foxhunt is quite incomplete without a list of accidents, more or less serious, that occur in the wild chase across ditches and fields. Foxhunting was a favorite sport in colonial Virginia and in later years has been revived. In England foxes are protected for the hunt regardless of the havoc they play in poultry yards.

The female fox or vixen usually prepares a nest for her cubs in a den in an open field, where they can play about and yet take to their hole with least likelihood of surprise. It is said that while a fox springs upon rabbits, partridges, and quails anywhere that it can find them, it will travel far to rob a hen roost rather than make possible trouble for itself and family by thieving near at home. See DOG.

FOX FARMING has within the last quarter of a century grown into a profitable industry in Canada, where the first fox farms were established. The number and value of foxes on farms in the Dominion in 1921 were:

Kind	Number	Value
Silver Foxes	13,694	$4,536,417
Patch foxes	1,1,03	87,735
Red foxes	373	11,810

The number and location of fox farms in the same year was:

Province	Farms
Quebec	105
Nova Scotia	95
Ontario	85
Alberta	12
British Columbia	10
Manitoba	6
Saskatchewan	4

Fox, Charles James (1749-1806), an English statesman and orator. He was born in London and died at Chiswick, near the city. He was the third son of Henry Fox, afterward Lord Holland. On his mother's side he was a great grandson of Charles II. Of morals it is sufficient to say he was quite of a piece with his royal ancestor. Charles Fox was educated at Eton and at Oxford. He entered Parliament in 1768 as a Tory. Fox was in public life during the stirring times of the American Revolution, the French Revolution, and during the first part of the Napoleonic wars. He was the supporter, the opponent, and again an ally of North. He sat in the British cabinet with North and the younger Pitt. He was a close friend of Edmund Burke. He was a prominent figure for nearly forty years.

Two years after he entered Parliament Fox became a member of Lord North's ministry. Later he was dismissed by North, at the instance of George III, who was annoyed by his dissolute manners and by his independent attitude. He then joined the Whigs and became a leader of the popular party opposed to the policies of the king. He was a member of the Rockingham ministry and again joined Lord North in forming a coalition ministry.

Fox foresaw that it would not do to leave India in the hands of private owners. He proposed to transfer the control from the East India Company to a commission. Though defeated he lived to see his policy carried out. Fox stood for the prerogative of Parliament. With other young men he forced King George to give over the notion of a cabinet responsible to himself instead of the House of Commons.

Like Burke, Fox stood out for a fair treatment of the American colonists. He wanted fair treatment for Englishmen everywhere. He saw the king and his war party humiliated by Saratoga and by Yorktown, and the king forced to withdraw from active control of the government. Driving home the lesson taught by the American Revolution, Fox joined Pitt in inducing Parliament to grant Canada a constitution.

Fox and Burke supported Pitt in measures designed to restore the authority of the Parliament of Ireland and to remove restrictions against Irish trade. He was clearly in favor of a measure of home rule. In the matter of the French Revolution Fox sided with the popular leaders. Though himself a descendant of aristocracy, he was one of the Englishmen whom the excesses of the Paris mob did not blind to the real significance of the Revolution and its importance to democracy.

Fox was a spendthrift and a gambler, a wild and reckless young fellow who wasted his father's fortune and brought his friends to the verge of despair. At the same time he was affectionate, lovable,

eloquent, clear of thought, and, as the outcome showed, sound on questions of public policy.

As a statesman he was less subservient than North; more impulsive, less calculating, and withal clearer in his thinking than Pitt. He lacked Edmund Burke's learning but, all in all, few English statesmen have shown greater foresight or have been more uniformly on the right side of important public questions than he. Fox deserves mention as one of the constructive English statesmen of the eighteenth century.

Fox, George (1624-1690), the founder of the Society of Friends, usually called Quakers. He was born at Drayton, Leicestershire, England. When only nineteen he left home under the conviction that he had a special call from God, and went about in severely plain garb, preaching the doctrine that the "inward motions of the spirit" were to be relied upon rather than the Scriptures, and advocating virtue, charity, and the love of God. His radical doctrine got him into trouble, and in 1655 he was examined before Cromwell, who had him released. His life was very charitable and Christ-like, and even those who opposed him recognized his evident sincerity. The customs which prevail among the Friends today he originated. He took off his hat to nobody, addressed all people as "thee" or "thou," and advocated simplicity in all things, particularly in forms of worship.

Fox, or Foxe, John (1516-1587), an English Protestant. During the persecutions in the reign of Queen Mary he fled to the continent. He wrote a vivid account of the pathetic sufferings of the Protestants, especially of the burning of Latimer and Ridley. His *Book of Martyrs* was long a standard volume in Puritan homes, but is now recognized as one-sided and not overly particular as to the facts of a most distressing period of English history.

Fox, John William (1863-1919), an American novelist, a native of Kentucky. He received his education at Harvard University. He has displayed special skill in depicting life in the vicinity of the Cumberland Mountains. His novels include *The Kentuckians, A Mountain Europa, A Cumberland Vendetta, Christmas Eve on Lonesome,* and *The Little Shepherd of Kingdom Come.* The last mentioned story is probably the best known and most popular of Fox's novels. It is a Civil War story, presenting, with unusual clearness and attractiveness, the views of noble-minded participants on both sides. Mr. Fox has published an account of his experiences as a war correspondent in *Following the Sun Flag.*

Fox and Geese, a favorite parlor game. It is played by two players. One manages the fox; the other has thirteen geese. The board is marked with a diagram having the shape of a Greek cross. Fox and geese may move in any direction backward, forward, or diagonally, from one intersection to another. The geese advance one at a time toward the fox. For each move of a goose the fox is entitled to a move. If at any time the fox occupies a space next a goose, and the space beyond the goose is vacant, the fox may jump over the goose and thus remove that goose from the board. The object of the geese is to pen the fox up in a corner, so that he can neither jump nor move. The object of the fox is to carry off, that is, to jump, so many geese that his imprisonment becomes impracticable.

Fox Hound, one of the swiftest, strongest and most intelligent of the hounds, is closely akin to the bloodhound. The fox hound rarely reaches a height greater than twenty-four inches; its color is white, with patches of black or tan. The name is derived from the fact that since a very early day this dog, especially in England, has been trained to hunt foxes, at which it becomes extremely skillful.

Fox Terrier, a small, strong, keen-witted terrier formerly used to drive foxes from their dens—hence the name—but now kept as a pet. Fox terriers usually weigh about twenty pounds; their color is white, with tan or black markings: the head is flat and rather narrow, with strong jaws; and the coat, though usually smooth, is sometimes rough and wiry. Sixteen different breeds are now recognized.

Foxglove, or digitalis, a handsome flowering plant, closely related to the monkey flower, pensteron, and gerardia. The want of similarity to a fox's foot has led to the thought that the word may be a corruption of folk's (fairy folks) glove, but "unfortunately etymologists discredit this pretty suggestion." Other popular names are fairy cap and witches' thimble. A suitable plant for borders, easily grown. The leaves of the purple foxglove, steeped in water or alcohol, afford a decoction used in medicine to stimulate heart action.

Foxtail Grass, the name commonly applied to certain grasses whose flower-head resembles the tail of a fox. One species of this grass is a very troublesome weed that often renders a field of clover almost valueless, while another species—meadow foxtail—is esteemed as a fodder plant. These and other foxtail grasses closely resemble timothy, with which they are, in fact, closely related.

Franc. See MONEY.

France, a country of southwestern Europe. It may be said to occupy the shoulder and neck of Europe, the extension of which into a head forms the peninsula of Spain and Portugal. France has an area of 212,659 square miles, being one-eighteenth of all Europe. It has a coast line of about 1,300 miles on the Atlantic and 456 miles on the Mediterranean. Its Spanish frontier is 419 miles in length. The Belgian, Luxembourg, German, Swiss and Italian frontier is 1,156 miles long. These land frontiers are composed almost entirely of mountain chains traversed by natural passes through which commerce may flow. With the exception of the Rhone, which flows southward into the Mediterranean, the longer rivers of France flow northwestward into the Atlantic. The longest line that can be drawn on French territory runs from the southeast to the northwest, a distance of 670 miles.

PHYSICAL FEATURES. The surface of France is greatly diversified, the mountains are low and rolling; and rivers are numerous, more than two hundred being navigable. Unlike Switzerland, the country is devoid of lakes. There are three well defined climatic regions—regions of wheat, wine and oils. The northwestern region, including Brittany, has fogs, mist, and a cold summer like that of England. The Mediterranean region has hot, dry summers, suitable to the growth of the fig, the olive and the citron. The intervening country is a land of vineyards and wheat fields, with abundant rainfall and clear, sunny skies. Nearly half of the people are engaged in agriculture. Nearly half of France is plow land; four-fifths of the remainder is in orchard, vineyard or meadow; less than one-tenth of the entire area is unproductive. At the death of a landholder his property is divided equally among his children. For this reason there are many small farms under a high state of cultivation.

The climate and soil are so varied that the productions of France are the same as those of Europe at large. All the desirable vegetables, fruits and cereals known are raised. The poultry, horses, cattle and swine of France are noted for their excellence. For general purposes the Norman horses are the most desirable known. They have speed, endurance and strength.

THE PEOPLE. Physically, the French people vary widely, the variance being accounted for by the intermingling of races, especially of the Teutonic and Latin races. The Teutonic characteristics—light hair and eyes, height and heaviness—prevail in northwestern France, and gradually fade out and are supplanted by slightness, dark skins, and short stature the farther toward the southwest one goes.

The spiritual elements of these northern and southern peoples are united in the French, making them one of the most interesting nations in the world. Under the wit, vivacity and laughter of the French is a stability and strength of character which, if ever doubted, can be so no longer—the French record during the World War making doubt impossible.

The genius of the French people has produced some of the most admirable works or art that the world possesses; and probably among no other people are so many positive qualities frequently united in one person. French military men often

make enviable reputations as statesmen, and French statesmen often produce notable works of art.

INDUSTRY. Approximately nine-tenths of the soil of France is productive, and about half of the total area is usually under cultivation. A great variety of crops is grown, but the cereals constitute the greater part of the agricultural products. Great quantities of sugar beets are grown, especially in the department of Nord. Meslin, hemp, rape, potatoes, buckwheat, flax, and corn are grown in quantities about sufficient for the needs of the country. Fruits and nuts are grown in large quantities the most important being apples, pears, peaches, apricots, oranges, mandarins, olives, lemons, berries, figs, chestnuts, walnuts, almonds and filberts. The quantity and quality of the French chestnuts are well known. Viniculture has been universal in France from the earliest days, and the wine produced is of such quality that it is known the world over. Tobacco is cultivated under government monopoly.

Cattle have lately become more numerous in France than sheep, though the latter were in excess for many decades.

The fisheries of France are extensive and very profitable. Sardines, caught in the Bay of Biscay are the highest in commercial importance, though salmon, tunny, herring, turbot, mackerel and anchovies are taken in large quantities for home consumption. Oyster breeding is engaged in to some extent, and French boats are always found at the cod fiisheries near the Newfoundland banks.

Textiles are the most important French manufactures. The silks of Lyons are well known, and laces, gauze, tapestries, woolens and cotton goods of the finest quality are produced. The metallurgical industries are second in importance, and the smaller metal products—tools, cutlery, etc.—are as fine as are made in any country. Building iron and steel, ordnance, motor cars and railway supplies are made in large quantities.

For so rich a country, France is singularly deficient in minerals. There are small coal fields in various parts of the country, but the only coal measures of great importance are situated near the Belgian frontier and around Lyons. Lead is abundant; a little gold has been found in the river beds, and small quantities of zinc, copper, arsenic and nickel are produced. Alum and common salt are produced in abundance from the lagoons and salt marshes of the coast. France is celebrated for its pottery clays. The porcelains of Sevres, Limoges and Bayeux are noted.

COMMERCE. France is important as a commercial nation, though not as much so as are some of her neighbors. In 1921 the merchant marine had a total tonnage of 3,101,199, and had about 900,000 tons building. The commodities listed among her manufactures constitute the chief exports. About 5,500 miles of navigable rivers, 3,600 miles of canals and 26,250 miles of railway add greatly to the shipping facilities afforded by her ports, the chief of which are Marseilles, Dunkirk, Havre, Calais, Dieppe, Boulogne and Bordeaux. Because of the disturbing effect of World War, reliable commercial statistics tre not available, but it is expected that the pre-war volume of trade will soon obtain.

EDUCATION AND RELIGION. Down to 1905 the laws of the Third Republic not only guaranteed religious freedom but provided subsidies for all religions having 100,000 or more adherents. Four sects received government assistance under this law,—Catholics, Protestants, Jews and Mohammedans. In 1901 a radical change began with the passing of the Association Law whereunder religious orders could exist only by special permission of the state. This was opposed particularly by the Catholics, since it meant the closing of practically all convents and monasteries. The strife thus begun continued until 1905, when the Law of Separation was passed and the state withdrew all support from religious organizations and proclaimed complete separation of church and state. Thus was dissolved the Concordat with the Papacy which had existed since the time of Napoleon in 1801.

In 1921, however, a rapprochement between France and the Holy See was again

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THRESHING SCENE AT PUNTY, FRANCE

effected, and the French embassy to the Vatican was reestablished.

Public and private education in France are supervised by a Minister of Instruction, assisted by the government educational bureaus. The public schools, divided into primary, secondary and superior classes, collectively constitute the University of France. In 1920 there were 2,849 public and private infant schools and 68,015 primary and higher schools; and in the same year there were 166 primary normal schools. Special and technical instruction is provided for by numerous institutions, and higher learning by sixteen universities, of which the University of Paris, established in 1150, is the largest.

GOVERNMENT. During the first decade of the twentieth century the population of France was roughly 40,000,000. Since the Franco-Prussian War of 1870-71 France has been a republic. National affairs are intrusted to a national assembly consisting of the Chamber of Deputies and the Senate. The deputies are elected for four years; the senators for nine years. The president of the republic is elected for seven years by a majority vote of the members of the two chambers sitting as a single body. There are ninety departments, corresponding to our counties. The departments are divided into communes, corresponding to our towns or townships. The commune has its own local government elected by universal male suffrage.

HISTORY. Since the restoration, 1815, France has had a more or less stormy history. The restored Bourbons, Louis XVIII and Charles X, had "learned nothing and forgotten nothing" during the period of the Revolution and the Napoleonic wars. Because, then, of their conservatism and reactionary measures, the July Revolution of 1830 took place, resulting in the establishment of the Orleans monarchy with Louis Philippe as king. In 1848 the republican element, despairing of any extension of the franchise or liberal reforms as long as Guizot retained his position as prime minister, overturned the monarchy in the revolution known as the "February Days," and established the Second Republic with Louis Napoleon, son of Napoleon's brother, Louis, king of Holland, as president. He used the period of the republic merely as a time of preparation for the coup d'etat which he accomplished in 1852, whereby the republican form of government vanished, and he was crowned as Napoleon III, Emperor of the Second Empire.

He was a man utterly lacking in the ability of his great uncle, but during the first eight years of his reign a somewhat successful foreign policy won him the good will of the French people. From 1860 his popularity began to wane both at home and abroad; at home a liberal movement was going on, and each concession by Napoleon led to greater demands. The United States was hostile because of his interference in Mexico; Austria had been antagonized by the Italian War. To crown all, Napoleon used the Hohenzollern incident as an excuse for war with Prussia. (See BISMARK.) France was utterly unprepared, and the humiliating defeat at Sedan meant the collapse of the Empire; on September 5, 1870, the Third Republic was declared. Unlike previous governments of France, the constitution was not drawn up as a single document, but as a series of constitutional laws which were not complete until 1875. In August, 1914, France, with England, Russia and other allies, became engaged against Germany and Austria in the greatest and most far-reaching European war in history.

EFFECT OF WAR. Nine of the most productive French provinces—about one-sixth of the total area—and 2,600 towns and villages were devastated during the World War. Thousands of miles of roads were destroyed, and canals and bridges were seriously damaged. Immediately after the signing of the Armistice, however, the French people set about to restore their country, and of 7,000,000 acres rendered unfit for cultivation as a result of the invasion, 280,000 acres were made ready for seeding by the spring of 1921.

The two valuable provinces of Alsace and Lorraine were returned to France. This caused great joy both to the inhabitants of these provinces and to the main

body of the French people, and added greatly to the national wealth.

France made strong reparation demands on Germany before the peace treaty was signed, but Germany later seemed disinclined to fulfil the terms of the treaty. This resulted in diplomatic conflict that culminated in an armed French invasion of the valuable Ruhr district of Germany in 1923.

COLONIES. Algeria is an integral part of the French republic. Other important possessions are Cambodia, Cochin China, Tunis, Congo, Madagascar, Guiana, and part of Farther India.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Area, square miles	212,659
Population (1921)	39,209,766
Foreigners	1,550,449
Chief Cities:	
Paris	2,906,472
Marseilles	586,341
Lyons	561,592
Bordeaux	267,409
Lille	200,952
Nantes	183,704
Toulouse	175,434
St. Etienne	167,967
Strasbourg	166,767
Le Harve	163,374
Nice	155,839
Rouen	123,712
Roubaix	113,265
Nancy	113,226
Toulon	106,331
Number of departments	90
Members of senate	314
Members of chamber of deputies	610
Bonded indebtedness	$ 48,048,424,700
Farm area, acres	98,181,070
Improved land, acres	59,127,750
Wheat, bushels	322,767,000
Corn, bushels	12,202,000
Rye, bushels	14,494,000
Oats, bushels	245,206,000
Barley, bushels	37,804,000
Potatoes, bushels	323,527,000
Flax seed, bushels	446,000
Tobacco, pounds	46,031,000
Hops, pounds	9,640,000
Beans, bushels	8,250,000
Peas, bushels	515,000
Sugar beets, short tons	370,032
Raw silk, pounds	551,000
Domestic Animals	
Horses	2,542,820
Mules	178,470
Asses	297,540
Cattle	12,782,110
Sheep	9,372,360
Goats	1,228,580
Swine	4,583,471
Sugar refineries	72
Operatives	15,405
Sugar, tons	335,500
Coal mined, tons	28,000,000
Pig iron, tons	3,777,000
Alcohol, gallons	28,489,000
Antimony, tons	11,000
Salt, tons	1,201,000
Potash	1,167,000
Miles of railway	26,250
Teachers in public schools	114,410
Pupils enrolled	3,988,852

France, Anatole (1844-), the pen name of Jacques Anatole Thibault, noted French critic and novelist, and member of the French Academy since 1884. M. France was born in Paris, and devoted himself to the study of literature in his youth. His earliest publications were not of very high value, but when his *Crime of Sylvester Bonnard* appeared it met with instantaneous success and placed him among the great writers of the world. This novel has been translated into most of the modern languages. It is a charming story of a scholar's life, told with gentle irony. Other works of M. France are *The Yule Log, The Wishes of Jean Servien, Our Children: Scenes in Town and in the Fields, Queen Pédauque's Cook-Shop, Opinions of the Abbé Jèrôme Coignard, The Garden of Epicurus, Abeille, My Friend's Book, Balthazar, Thais, Literary Life, Alfred de Vigny, The Red Lily* and *The Revolt of the Angels,* dealing with the adventures of Lucifer after his banishment from heaven.

The literary critiques of M. France are brilliant and trenchant, and at the same time full of a graceful humor. He is looked upon as one of the first stylists of contemporary France and its most distinguished novelist. But he not only shines as a litterateur, for this serene bibliophile is also a philosopher. He showed himself to have unbounded courage in the famous Dreyfus case, when against all France he espoused the cause of the oppressed defendant in this celebrated trial. He has also been a warm champion of socialism, as is shown in his *Socialistic Opinions.* In a general way the aim of M. France in his novels is to portray the thoughts of Frenchmen of culture of his time. Almost

all of his works have been translated into English. In 1921 M. France received the Nobel prize for literature, to the intense delight of his countrymen.

Francesca, Piero Della (1420?-1492), an Italian painter, was born at Borgo San Sepolcro. He began his career as an assistant to Dominico Veneziano. In 1451 he painted a fresco at Rimini, for the church of San Francesco. Some time after this he began his great work, the "Story of the True Cross," which represents parts of the life of Adam, Solomon and the Queen of Sheba, St. Helena and Constantine, in the form of frescoes in the choir of San Francesco, Arezzo. Among his other great paintings are the portraits of the Duke Federigo of Urbino and of his wife, Battista Sforza; the *Madonna* in the Brera; the *Flagellation of Christ* in Urbino Cathedral. Other notable frescoes are *St. Louis of Toulouse* and the *Resurrection,* in the town hall of Borgo San Sepolcro; *Hercules,* in the Gardner collection, Boston; and a *Magdalen* in the cathedral of Arezzo. Among his important panels are a *Baptism of Christ,* and a *Nativity,* in the National Gallery, London; an *Annunciation* in the Gallery of Perugia; *St. Thomas Aquinas,* in the Poldo Pezzoli collection, Milan, and the *Triumph of Chivalry,* in the Gallery of the New York Historical Society. Francesca was one of the great realists of his century, and the forerunner of the later brilliant developments. He excelled as a colorist and was one of the first Italian painters to solve the question of light and atmosphere. His modeling of figures shows him to have been a close student of anatomy. Piero Francesca, in addition to his knowledge of art, was a scientist of note, and wrote several books dealing with scientific matters. Among his pupils were Melozzo da Forli and Luca Signorelli.

Francheville, Pierre (1548?-1618), a French sculptor, was born at Cambrai. He studied art in Paris, later going to Germany and Austria. He drifted to Innsbruck and there became apprentice to a wood-carver. His work drew to him the attention of the Archduke Ferdinand, who became his patron, thereby enabling him to study at Florence under Giovanni da Bologna. During this period he assisted his master in the execution of many famous works. His reputation spread so rapidly that in a short time he had received commissions for a great deal of work, the execution of which shows remarkable proficiency. After his superb work the *Allegorical Figures of Humility, Chastity and Wisdom,* now in the Nicolini Chapel at Florence, was finished, he was summoned to Paris by Henry IV, who appointed him court sculptor. In this position he executed many busts, statues and vases for the royal gardens, one of them being *David with the Head of Goliath.*

Franchise, in social science, a permit or grant authorizing an individual or a corporation to undertake a public service. A franchise may be granted by a city, state, or nation. The term is used most frequently in connection with municipal affairs. The granting of franchises is directly opposed to public ownership. Many are of the opinion that a city should own all branches of public service that are natural monopolies. A gas system, a telephone, and a water system are of this description. Some franchises, as the right to operate a ferry, can be acquired by common law. A monopoly is his who establishes the first ferry so long as he renders efficient service; but ordinarily franchises are conferred by formal grant of a duly empowered body, as a city council.

The granting of franchises is the occasion of public scandal and corruption. It is beyond dispute that corrupt men seek places in legislative bodies, and particularly city councils, to traffic in privileges. Corporation officials, having or desiring to hold a franchise, pay agents to lobby. They entertain councilmen, subscribe to campaign funds, push the nomination and election of tools, buy votes outright, and pay blackmail to ward off the raids of vicious councilmen. The matter has been managed with a greater degree of honesty, and with more regard to the interests of the public, in European cities than in America. The toleration with which the plundering of the public is regarded in this country has no counterpart in Europe. Some of the principles that should govern are:

FRANCHISE

1. Franchises should not be granted at all. The public should own its plants and should employ skill and honesty to manage them.

2. If a franchise is to be granted, an intelligent committee of the council should visit other towns or cities, read trustworthy publications, and, in case of doubt, employ an honest expert. A few hundred dollars spent in this way is an excellent investment.

3. All grants should be for a limited term. The duration of the franchise should be made to fit the difficulty and expense of installment. A telephone service is not difficult to install. A large part of the outfit may be moved without serious loss. A gas plant and a system of pipes are expensive, and once in are practically useless for removal. If a ten year term is a sufficient inducement for a telephone company, thirty years is little enough for a gas franchise. In any case, the rights of the company should terminate at the expiration of the time limit. The franchise should return to the city, just as a leased farm returns to the owner when the time is up.

4. Explicit provision should be made for taking over the plant at the end of the term, if desired, at a fair appraisal value, not counting the franchise, which, of course, returns to the city.

5. A city or town desiring to grant a franchise or to renew an old one should draw up its own franchise and advertise for takers. It is a mistake for a council to allow itself to be besieged by a proposed company. A new town may find it necessary to pay a bonus, but ordinarily a franchise worth the having is worth paying for. The larger the city the greater the value of a franchise, and the better the bargain the city should make.

6. A franchise should be leased like a house or a farm. The rent may be an annual return; it may be a service to the city; it may be a share of the proceeds; or it may be a proper combination of all three. Here is where the interests of the public need guarding. This is the point where incompetent and dishonest councilmen sell out the interests of the public; for streets are property and a franchise has value. As a plain illustration of what is meant, the Edison Electric Illuminating Company obtained a lighting franchise from New York City, paying the pitiful sum of one cent per lineal foot for the streets occupied by wires and tubes. A committee, appointed in 1901 to investigate the affairs of this company and its successors, reported substantially that the holders were paying themselves $2,000,000 interest on fictitious bond issues, had $8,000,000 undivided surplus on hand, were charging private consumers as high as fifteen cents for what cost not to exceed 6.32 cents, interest on watered stock included. Nor is this all; in return for giving the company this opportunity to plunder the public, the city of New York was paying the company $80,000 for lights that the company would have been glad to duplicate for a business firm for $25,000. Contrast the street car system of Berlin which paves from curb to curb the streets on which the cars run, and pays the city $200,000 a year in taxes. It is not well to live in a state of suspicion and distrust, but officials ought to make the same kind of a bargain for the public that they would make, under similar conditions, for themselves.

7. A franchise, if granted, should be exclusive. The company takes the franchise to make money, and should be guaranteed the opportunity to do so without ruinous competition. Fair dealing—favorable terms to the company and favorable terms to the city—should be the policy in granting franchises.

8. Every franchise should provide that the accounts of the holder should be open for the inspection of a public examiner. This feature is essential. Publicity of accounts is necessary to intelligent action. A company unwilling to make its accounts public should be permitted to confine its operations to private business.

9. The charge for service should be fixed on a sliding scale. As the volume of traffic or consumption increases, rates should fall.

10. The quality of service should be stipulated and safeguarded. To this end, the plant should be open to official inspection.

11. The corporation should be sheltered from arbitrary and dishonest demands. The city should give the company a fair opportunity to make money. The city is the owner. The corporation is the renter. Unless the owner gives the renter a fair chance, the renter cannot do well by the owner.

Francis I (1494-1547), a king of France. He succeeded to the throne in 1515. In 1519 he strove to be placed at the head of the Holy Roman Empire, but he was defeated by Charles of Spain who became the famous emperor Charles V. The life of Francis was spent chiefly in carrying on expensive wars with his successful rival. In 1525 he was taken captive at the battle of Pavia and was held a prisoner until the next year. He has been severely criticized by Christian historians for an alliance with Solyman the Magnificent, sultan of Turkey. Francis was a ruler of ability and deserves to be held in esteem by his country. His grandson, Francis II, is known in history chiefly as the husband for two years of Mary Stuart, Queen of Scots. See FIELD OF CLOTH OF GOLD.

Francis Joseph I (1830-1916), an emperor of Austria and king of Hungary. This ruler who, both in point of time and age, was the oldest reigning monarch in Europe, came to the throne in the troublous revolutionary period of 1848. Vienna was in the hands of the Liberals, Bohemia was in revolt, Hungary was demanding autonomy with complete control over her subject states. Emperor Ferdinand, weak and vacillating, was unable to cope with the situation, and December 2, 1848, he abdicated in favor of his nephew, Francis Joseph. Though crowned as emperor the Hungarians refused to recognize him as their king, and in April, 1849, declared themselves wholly independent of Austria. With the failure of revolutionary movements in the other countries, the uprisings in the Austrian empire were gradually put down; Hungary was conquered and put under martial law. Absolutism continued to be the general order until after the Seven Weeks' War with Prussia. Then Francis Joseph recognized that concessions must be made or Hungary, too, would become independent. Accordingly he gave up the idea of a centralized Austrian empire and consented to the formation of the Dual Monarchy, Austria and Hungary each to have its own constitution, that of the latter being closely modeled on its ancient one. With the receiving of the constitution, Hungary also accepted Francis Joseph as king, and he was crowned with great ceremony in Buda Pesth, June 8, 1867.

No sovereign of modern times has had the difficulties to face that confronted Francis Joseph. Ruler over diverse peoples including Germans, Czechs, Poles, Ruthenians, Magyars, Rumanians, Serbs, Croats, and many others, it was no easy matter for a sovereign to hold together such a medley of tongues. That Francis Joseph ruled over a more extensive territory in 1916 than he did in 1848, speaks volumes for his tact and executive ability. The latest addition was that of Bosnia and Herzegovina in 1908.

Besides political difficulties, the emperor had to meet serious troubles of a personal nature. In 1889 his oldest son and heir presumptive to the throne committed suicide. In 1898 his wife, Empress Elizabeth, was assassinated in Geneva by an anarchist. His nephew and heir to the throne Francis Ferdinand and his wife were assassinated in June, 1914, by a Servian student in Bosnia. This was thought by Austria to be the result of a Servian conspiracy and an ultimatum was sent to Servia with demands which that country felt it could not in honor accept. War was declared by the Dual Monarchy and the European War of 1914 began. Thus at the age of 84 Francis Joseph became involved in what proved to be the greatest conflict in history.

Francis of Assisi, Saint (1182-1226), a noted Italian monk. He was born at Assisi and, though a traveler, he died there. He was a man of oratorical ability and of fervent piety, "The John Wesley of the thirteenth century, whom the church did not cast out." He was moved by compassion for the misery of the inhabitants of the Italian town. He gathered a few friends about him, walked to Rome to secure the permission of Pope Innocent

III, and organized the Franciscan order of friars, or brothers. They went forth two and two, clad in the garb of poverty. They were religious workers, and labored to heal both body and soul—to relieve misery. Francis was declared a saint by Gregory IX in 1288. October fourth, the anniversary of his death, is observed as the day of St. Francis.

Franciscans, frăn-sĭs′kanz, a general name given to three religious orders founded in the thirteenth century by St. Francis. The first order is that of Franciscan friars; the second order is that of Franciscan nuns; the third order includes both men and women. The last order now more numerous, consisted of people unable to break existing domestic ties or to withdraw themselves from the ordinary pursuits of life. They were bound by oath to dress plainly, to eat simple food, to fast, to pray, and to lead lives that would be an example to the community in which they lived. The order of Franciscan friars was approved by Pope Innocent III in 1210. It grew rapidly. In ten years there were 5,000 members. In 1260 there were 1,400 Franciscan houses in France, where the members were known as Cordeliers. In England and Scotland they were known from their garb as Grey Friars. In 1680, according to the historian of the order, there were 100,000 Franciscans in Europe. Many of their houses were known as centers of learning. More than one Franciscan friar filled a university chair. The noted Roger Bacon was a member of the order. There are a number of Franciscan houses in the United States. The total number of members of the order in all countries is now estimated at about 17,000.

Francke, frän′ke, **August** (1663-1727), a noted German educator. He was born at Lübeck and was educated chiefly at Leipsic. After holding various educational positions, he became a professor in the University of Halle. He belongs to the same group of men as Pestalozzi. He became deeply interested in the deplorably ignorant and neglected condition of the children of the poor. He established an orphan asylum, a school for the poor, and a training school for teachers at Halle. During his lifetime he had the privilege of seeing his institutions attended by over 2,000 pupils of various sorts. His institutions are still maintained by the city of Halle. The schools now form an integral part of the public educational system. Students of European schools consider a visit to the Francke institutions indispensable. Francke is one of the best known names in the history of German education. See HALLE.

Franco-Prussian War, the war of 1870-71 between France and Germany. The real cause of the war was jealousy between France and Prussia. The immediate cause was the election of a prince of the Prussian house of Hohenzollern to the vacant throne of Spain. In response to the demands of France, this candidate was withdrawn, but the French ambassador pushed his demands to the verge of affront.

The inside history of the "affront" is of interest, as it indicates the petty, underhand methods of a really great man. Bismarck built up the Prussian army for three ends,—the enlargement of Prussian territory, the expulsion of Austria from the German family of states, and the organization of a new German Empire. Two of these ends had been attained. Prussian territory had been doubled and Austria was struggling on the Danube alone, held in leash with Hungary.

To forge the links of an imperial union, Bismarck required the patriotic glow of a national war. A war with France was what Bismarck wanted, and was what he had to have to carry out his third measure. Bismarck wrote afterwards "that a war with France would follow that with Austria lay in the logic of history," but it rested in his brain more than it did in the logic of history. Bismarck knew that once the German princes were accustomed to say "We" in a great Germanic enterprise like a campaign of Germans against their hereditary foes, the French, they would gravitate in accordance with the "logic of history" and a few other considerations into the desired imperial union. It seems a pity to inject the commonplace into history; but Bismarck's army was ready, the taxpayers were impatient, the greatest German of his century needed war, and he needed it immediately. The Prus-

sian king, William, walking in a garden at Ems for his health, turned aside the insistent French ambassador, Benedetti, with courtesy; but Bismarck, not disdaining to garble a telegram, made it appear to the world that William had been crowded offensively; that he had snubbed the French ambassador unmercifully; and that, by turning on his heel and leaving Benedetti, he had virtually told Napoleon to attend to his own affairs. Napoleon was furious and foolish. He fell into Bismarck's trap. War was declared by the French July 15, 1870. The Germans, being the attacked party, were in position to issue stirring proclamations in favor of defending the Fatherland. War found the Prussians prepared. Provisions, ammunition, arms, cannon, maps, even marching orders were all in readiness for immediate use. The minister of war, Von Moltke, had but to touch a spring, as it were, to set the entire military machinery of Germany in motion. To the surprise of Louis Napoleon, the neighboring German states sided with Prussia. France, on the contrary, found herself in no condition for war. Enormous sums of money had been squandered or worse. The military force of the country was unfit for service. Ammunition did not fit the guns for which it was sent; harness was rotten; supplies purchased at enormous prices were not in existence. One disaster followed another. Worth, Metz, Sedan, and Strasburg have passed into history to offset the glories of Marengo and Austerlitz.

Napoleon III surrendered to the Germans, and soon left France forever. The French republic was declared. Paris was occupied by the German troops March 1st. Peace was concluded at Frankfurt May 10, 1871. Alsace-Lorraine was ceded to Germany. The French paid an enormous indemnity of $1,000,000,000, and set about reforming their government and army. While the German army lay at Versailles, Lewis, king of Bavaria, sent the following circular letter to the king of Saxony and to the other rulers of the various German states:

Most serene and powerful Prince, dear Friend, Brother, and Cousin:

Victoriously led by Prussia's heroic King, the German tribes, who for centuries have been united in language, manners, science, and art, now celebrate a brotherhood of arms which gives a glorious proof of the importance of the power of a united Germany. . . . I now address myself to the German Sovereigns, and especially to your majesty, to propose that you should, together with me, urge upon his majesty the King of Prussia, that the exercise of the presidential rights be united with the title of Emperor.

January 17, 1871, the king of Prussia thus addressed the German armies:

On this day, ever memorable to me and my House, I take, with the consent of the German Princes, and the adhesion of all the German people, in addition to my rank as King of Prussia, that of German Emperor. Your bravery and endurance, which I again recognize to the fullest extent, have hastened the work of the unification of Germany, a result which you have achieved at the sacrifice of so much blood. Let it always be remembered that brotherly feeling, bravery, and obedience, have rendered the army victorious.

On the next day at Versailles representatives of the North German states assembled in the great hall of the palace of Louis XIV. They created the new German Empire, and crowned the Prussian William III emperor.

The war was short and decisive. Excepting always the Napoleonic wars it is safe to say no other conflict of modern times has brought about more momentous results, or caused a greater shift of political influence.

See SEDAN; NAPOLEON III; ALSACE-LORRAINE; BISMARCK; VERSAILLES; GERMAN EMPIRE.

Frankenstein, a novel by Mrs. Mary Wollstonecraft Shelley, wife of the poet Shelley. The story was published in 1817. Frankenstein is a young student who yearns to create a living being. The idea is borrowed doubtless from the old myths of Prometheus and Pygmalion, but, lacking the poetic beauty of the old tales, it seems the result of a morbid and despondent imagination. Frankenstein, after a long series of laboratory experiments, creates a monster from materials found in the dissecting room and succeeds in giving it life. Lacking soul, the creature is a fiend, who becomes the curse of the creator. He slays Frankenstein's friend, strangles his bride, and pursues him over land and sea.

Finally Frankenstein dies on shipboard, and the monster leaps over the ship's side and disappears. As Frankenstein neglected name as well as soul in his creative experiments, his own name has come to be given to the monster, to whom frequent reference is made in literature. Mrs. Shelley's story possesses a strange, uncanny, fascination for the average reader. It may, in this respect, be compared to Stevenson's *Dr. Jekyll and Mr. Hyde.*

Frankfort, Ind., the county-seat of Clinton County, is 47 miles northwest of Indianapolis. The Vandalia, Lake Erie & Western, the Toledo, St. Louis & Western and the Chicago, Indiana & Louisville railroads enter the city. It is connected by interurban lines with Lafayette and Indianapolis.

There are several fine buildings in Frankfort, including a Federal building, courthouse, opera house, Elks' Home, Masonic Temple and a Carnegie library.

Several large grain elevators are located here, and the city is an important grain center. It is also a wholesale market for food supplies and other material. The leading manufactories include saw mills, a large creamery plant, and factories that turn out brooms, stoves, furnaces and kitchen cabinets.

Frankfort was founded in 1830 and chartered as a city in 1875. Population, 11,585.

Frankfort, the capital of Kentucky. It is built on the banks of the Kentucky River, twenty-nine miles northwest of Lexington in a region famed for its beautiful scenery. On the slope of a hill near the city, in an old cemetery, Daniel Boone and other great men are buried. Numerous state institutions are located there. Some of them are a home for feeble-minded children, the state penitentiary, a normal school for colored students and the capitol. Other important buildings are the courthouse, public library, the King's Daughters' Hospital, a military school and a school for girls. The city has manufactures of twine, pottery, carriages, lumber, furniture, cotton goods, and flour. Pop. 1920, was 9,805.

Frankfort-on-the-Oder, a town of Germany, is situated on the left bank of the Oder, 50 miles by rail from Berlin. It is well built, with fine streets and squares adorned with monuments. There are many fine old churches here, among them the Evangelical Church of St. Mary, built in the thirteenth century, with remarkable wood carvings, stained glass, and a candelabrum 13 feet high; and the Reformed Church, also built in the thirteenth century. There is also a Rathaus, built in 1607, and a fine municipal building.

The manufactures include machinery, iron products, pottery, musical instruments, chemicals, leather, woolens and silks. The town is connected by canal with the Elbe and the Vistula. Three annual fairs are held here.

Near the city is Kunersdorf, the scene of the victory of the Austrians and Russians over Frederick the Great in 1759. Frankfort suffered in the Thirty Years' War and the Seven Years' War, as well as during the Napoleonic Wars.

Frankfort was granted municipal rights in 1253, and from thenceforth developed into an important commercial center. Population, 65,055.

Frankfurt, an important city of western Prussia. It is situated on the Main, about twenty miles from the Rhine. From its situation, it is known as Frankfurt-on-the-Main. It is the capital of a district of the same name. Like other medieval cities, it was once surrounded by massive stone walls, now removed to make place for promenades and public gardens. There are many public squares adorned with monuments. Gutenberg, the printer, Goethe and Schiller, the poets, have been remembered. There are many buildings of historical interest, including the cathedral and the imperial palace where the emperors were elected. Numerous museums, the town library, the art institution, and the zoölogical garden are of interest. The city dates from the time of Charlemagne. It was for centuries an imperial city authorized to hold an autumn fair. Its horse and leather fairs are still of importance. It early became an important commercial city and was for a long time the financial center of Europe. The Rothschild family rose to fame in Frankfurt

When we know that during the nineteenth century this firm of Jewish bankers placed loans for the various governments of the world to the amount of not less than $12,960,000,000, and remember that their parent office has been maintained at Frankfurt we can realize the importance of this city to the financial world. Population, 433,002. See GOETHE; ROTHSCHILD.

Frankincense, frăn k'ĭn-sĕns, an aromatic gum. The syllable *frank* means free from impurity, hence pure. The frankincense of antiquity was obtained from various gum-producing plants, especially a certain tree found in eastern Africa and southern Arabia. It was akin to myrrh and balm of Gilead, and was much used in swinging censers in religious observances. Modern imitations are made from the gum which collects on the trunks of the turpentine pine of the Southern States. See PERFUME.

Franking, the privilege of sending postal matter free of charge. Up to 1830 this privilege was enjoyed by senators, congressmen, and the various departments of public service. It was then abolished for a time, being replaced by a system of allowance for postage, but was again restored. Public documents and seeds may now be sent out by the various departments and by senators and congressmen. The franking custom was inherited by this country from Great Britain, where the members of Parliament long enjoyed the privilege. Congress has been wont to grant the privilege as a courtesy to the widows of ex-presidents. See POSTOFFICE.

Frankland, State Of, the name of an organization of the inhabitants of east Tennessee who, in 1784, protested against the action of the state of North Carolina in depriving its citizens of state government. At the end of the Revolutionary War, Congress asked the states that held western lands to cede them to the government. North Carolina agreed, but the people of Tennessee, which then was a part of North Carolina, refused and set up a new state, which they called Frankland. The provisional government lasted but a short time. Discord soon sprang up between opposing political parties, and, after a great deal of difficulty, North Carolina suppressed the new state. In 1796 the Territory of Tennessee was admitted as the sixteenth state of the Union. See TENNESSEE, subhead *History*.

Franklin, Battle of, a fiercely fought and bloody battle which took place on November 30, 1864, at Franklin, Tennessee, between a Federal army of 25,000 under General Schofield, and a Confederate force to the number of about 40,000 under General Hood. In the early part of November, 1864, Schofield took command of a Federal force of 25,000, at Pulaski, Tenn. Against this force Hood advanced on the 21st, when Schofield slowly withdrew towards Nashville, under orders from General Thomas to impede the Confederate force until Thomas could decide upon a line of action. He succeeded in frustrating the Confederate movements and arrived at Franklin at dawn on the 30th. He immediately set about improvising bridges and throwing up breastworks against a possible attack by the Confederates and stationed General Wagner with two brigades in advance, with instructions to withdraw behind the entrenchments in the event of a Confederate attack. However, the Confederates advanced and the Federals, being unprepared, were thrown into great confusion. General Opdycke, without instructions, put his brigade into action and saved the day for the Federals. Very fierce fighting ensued, the Confederates repeatedly making desperate attacks, to be repulsed each time by the Federals. During the night Gen. Schofield withdrew and joined Gen. Thomas at Nashville.

Franklin, Benjamin (1706-1790), an eminent American. He was the youngest of seventeen children. His father was a Boston candlemaker. Both sides of the family sprang from English stock noted for good habits and common sense.

It was desired to educate Benjamin for the ministry, but family circumstances forbade. After two short years of schooling he was taught to make candles. He employed his leisure in playing ball, in fishing, and in reading such books as *Pilgrim's Progress* and *Plutarch's Lives*. At his father's suggestion he took Addison's

essays in the *Spectator* as a literary model. He read an essay, then laid it by for a short time, and endeavored to reproduce it. By comparing his effort with the original essay he was able to note the superiority of Addison's style. An older brother was the publisher of the *New England Courant*. Franklin amused himself by writing essays in the *Spectator* style on such themes as *Widows, Boston at Night, Poetry in New England,* and *Match Making*. These he slipped under the door of his brother's printing office. He had the pleasure of seeing himself in print and of hearing the family comments made in utter ignorance of the fact that the writer was one of their own circle.

Fearing later an inclination to go to sea, Franklin's father bound him as an apprentice to this older brother for a term of years. Benjamin remained in the office long enough to learn his trade thoroughly, but differences of opinion arising, he ran away to Philadelphia. Here he landed with scarce money enough to maintain himself a week. His first meal was made of dry rolls of bread, which he munched as he went along the streets looking for work. His future wife, then a young girl standing in her father's door, remembered laughing heartily at the figure he cut. The incidents of his youth and his early struggles in establishing himself in the printing business in Philadelphia are told in his autobiography, one of the best books for boys ever written.

Franklin is considered by many our most eminent American. Though descended from ordinary working people, he was a firm believer in the adage that "a plowman on his legs is higher than a nobleman on his knees." He inherited a clear mind, a strong body, and excellent habits. When others dawdled, he worked; where others wasted, he saved; while others idled, he read. At first he worked for wages; afterward he opened a printing office of his own. Rather than disappoint a customer he would work all night. He was not above taking his printing paper to his office in a wheelbarrow. He became known speedily as the most accurate, prompt, capable printer in the colonies. Public printing brought to him yielded a large revenue.

Few men have worked harder to make their own fortunes; few men have been more anxious to help their fellows to rise. For many years he owned and published the *Pennsylvania Gazette*. During his management it circulated from Maine to Georgia, and was the most influential newspaper in the colonies. He made it the vehicle of his thoughts on politics, business, education, thrift, economy, methods of farming, and all those homely topics that endear a family newspaper to the husbandman and housewife.

At the beginning of 1733 he embarked in the publication of what has become known as *Poor Richard's Almanac*. It was a small annual pamphlet filled with the usual information as to the days of the month, eclipses, and the like. It contained weather predictions and was preceded always by a preface, a sort of humorous introduction, dealing with such topics as *The Bachelor's Folly, The Parson's Wine, Conjugal Debate, Men and Melons,* etc. The distinguishing feature of the Almanac, however, was a budget of homely proverbs. Some of these were original. Others were borrowed from various literatures. Here are a few of them:

Light purse, heavy heart.
Lying rides upon debt's back.
Little boats should keep near shore.
Plow deep while sluggards sleep.
A small leak will sink a large ship.
It is hard for an empty bag to stand upright.
Silks and satins put out the kitchen fire.
Many foxes grow gray, but few grow good.
He that falls in love with himself will know no rivals.

In the day when the Bible was often the only book in the house, the arrival of a new number of *Poor Richard's Almanac* was an event. The jokes and proverbs were read and discussed and laughed over. They entered deeply into the thought of the people, and contributed not a little to the shrewd, hard-headed way of looking at life for which the early colonists were noted. The old numbers were hung up by the fireplace. Franklin sold about 10,000 copies a year. Originally the Almanac sold for a few pence. The few, well thumbed, smoke-begrimed copies now preserved in eastern libraries cannot be purchased at any price.

When he had acquired a competence Franklin retired from business. He devoted himself henceforth to his studies and to public life. He was clerk of the Pennsylvania Assembly, postmaster of Philadelphia, and deputy-postmaster-general for the British colonies. He was twice sent to England to transact business for Pennsylvania with the heirs of William Penn and with Parliament. He was a member of the Second Continental Congress, and was one of the committee of five chosen by Congress in 1776 to draw up the Declaration of Independence. During the Revolutionary War he resided as ambassador at Paris and was one of the commissioners who drew up the treaty of peace at its conclusion. The aid given the American cause by France was due not a little to Franklin. On his return to Philadelphia he was made president of the executive council of the state. He was a delegate to the Constitutional Convention of 1787. His is the only American name that appears on all four of the great documents connected with the American Revolution: the Declaration of Independence, the Treaty of Alliance with France, the Treaty of Peace with Great Britain, and the Constitution of the United States.

Though his long and busy life was filled to the full with business and politics, Franklin yet found time to take a deep interest in the scientific investigations of the day. Philadelphia was the center of American scientific thought. The Quakers were more tolerant of scientific ideas than were the Puritans of New England. Bartram's botanical garden on the Schuylkill, now a pleasure park of Philadelphia, was famed in Europe. Dr. Rush was the most eminent medical man on this side of the Atlantic. Rittenhouse and others had attracted attention by scientific papers and experiments. By sending up a kite during a thunder storm, Franklin established the identity of lightning and electricity. He showed that the cloud and the earth act like the two coatings of a Leyden jar. He invented the lightning rod. Though blamed by the clergy of the day for toying profanely with the lightning of the Lord, he won reputation at home and abroad. He was made a doctor of laws at Oxford, a member of the Royal Society of England, and was admitted to the French Academy.

Franklin was an inventive man. He would have made an excellent machinist. His name is connected with an astonishing number of practical inventions. He devised a remedy for smoky chimneys; invented the Franklin stove; improved the printing press; told sailors how to better the rigging of their ships; introduced practical improvements in carriage wheels and windmills. He might have made a fortune by patenting his various inventions.

While abroad he busied himself sending home seeds, roots, and cuttings that he thought might be of advantage to the American gardener. He established the American Philosophical Society and the University of Pennsylvania. The city of Philadelphia owes him much. He set on foot a public library. As a citizen he was active in the matter of pavements, street crossings, the establishment of a fire company and of a police force. If we trace our public libraries, our magazines, and our postal service to their beginnings, they will be found to have emanated from the active mind of Benjamin Franklin.

Though he lived to the age of eighty-four, we may believe readily he never knew an idle moment. His mind was occupied to the very last with plans for the improvement of his fellow men. In point of industry, shrewdness, farsightedness, thrift, inventiveness, and philanthropy, he is our leading American. It is not too much to say that no American has had a greater influence on the thought of this country. Franklin lies in a modest grave in the heart of Philadelphia. In a serious moment he once composed his own epitaph:

THE BODY
OF
BENJAMIN FRANKLIN
PRINTER
(LIKE THE COVER OF AN OLD BOOK
ITS CONTENTS TORN OUT
AND STRIPT OF ITS LETTERING AND GILDING)
LIES HERE, FOOD FOR WORMS.
BUT THE WORK SHALL NOT BE LOST
FOR IT WILL (AS HE BELIEVED)
APPEAR ONCE MORE
IN A NEW AND MORE ELEGANT EDITION
REVISED AND CORRECTED
BY
THE AUTHOR

Franklin, Sir John (1786-1847), a noted Arctic explorer. He was a native of Lincolnshire, England. He entered the English navy in his youth. He was present at the battle of Trafalgar in 1805, and took part in the expedition against New Orleans in 1814. While in the service of the government he became interested in the exploration of the Arctic coast of North America. In 1845 he was placed in command of an expedition to survey the waters and coasts from Baffin's Bay westward. He sailed with two ships, the Erebus and the Terror, May 18, 1845. The expedition was last heard of off the entrance of Lancaster Sound, July 26, 1845. No less than thirty-nine relief expeditions, public and private, were sent out to search for Sir John and his ill fated companions. In 1857 the yacht Fox, sent out by Lady Franklin, returned with the first authentic information. A number of articles, including a journal kept by one of Franklin's officers, was found in a heap of stones. In 1869 Captain Hall succeeded in purchasing from the Eskimos over 150 articles recognized as belonging to former members of the expedition. In 1880 Lieutenant Schwatka explored Prince William's Land where he found the bodies of a large number of the party, together with the scientific records which had been hidden in a cairn. The account of the Franklin expedition forms an important chapter in the history of Arctic exploration. Queen Victoria was much pleased with the efforts of the Americans to get news of the lost Sir John. In 1881 she presented the White House a chair made from the timber of Franklin's ship, the Resolute. See ARCTIC REGIONS; NANSEN; DE LONG; GREELEY.

Franks, the name of a confederation formed about the year 240 by tribes who lived on the banks of the lower Rhine and the Weser, who united and took the title of Franks, or free men. In 256 they invaded Gaul (ancient France) and for 12 years ravaged that country and Spain. They were driven into their native haunts in 277. Thereafter they made numerous wars, sometimes with success, and sometimes suffering defeat, until in 418 they again invaded Gaul, where under their leader, Pharamond, they founded the modern kingdom of France. History states that of all the barbarian people they showed themselves most capable of assimilating the Roman culture of the countries which they conquered.

Fraser River, a very important river of western Canada, is formed by the confluence of two forks, one of which, the main river, called the South Fork, rises in the Rocky Mountains near Yellow Head Pass; the other, named the North Fork, also rises in the Rockies, near Smoky River Pass. The North Fork is not as important as the South Fork; it flows almost due west from its source and joins the South Fork, 160 miles southeasterward of the source of the latter. From this point the river is known as the Fraser. At a short distance from the junction, the Fraser swings sharply around the northern end of the Cariboo Mountains and takes a southward course, almost reaching the international boundary, and emptying into the Gulf of Georgia between the Canadian mainland and Vancouver Island.

The Fraser has a total length of 695 miles and drains a region that is 142,000 square miles in area, almost all of the southern half of British Columbia; but this swift and beautiful stream is navigable for only eighty miles, being so rapid in many miles of its course as to be navigated only with great danger even by canoes. The Stuart River flows into the Fraser not far below the junction, bringing the surplus waters of two lakes—Stuart Lake and Fraser Lake. From the west, the Blackwater next joins the Fraser; from the east, the Quesnel; from the west again comes the Chilcotin; and last and most important of the tributaries is the Thompson.

The Fraser is noted not only for its swiftness and wild beauty, but also for its economic value. The salmon fisheries of this river are the most important in the Dominion, and it furnishes a cheap and easy means of transportation for the great quantities of timber cut on its lower course. Placer mining flourishes on the banks of the Fraser and the Thompson, and vein gold is found in its course.

Fraserville, Quebec, on the right bank of the St. Lawrence River where it is joined by the Rivière du Loup, is the county town of Temiscouata County. This town, 115 miles northeast of Quebec, was founded in 1874, and has attained considerable industrial importance, aided by an abundance of water power. It is also a popular summer resort. Fraserville is served by the steamers of the Saguenay Line, and by the Intercolonial and Temiscouata railroads. Besides a large railroad repair shop, there are brickyards, furniture factories, pulp, grist and lumber mills, machine shops and foundries. The town contains eight schools, a library, a handsome post office and an armory. In 1921 the population was 7,703.

Fraternal Organizations, associations for good fellowship and helpfulness. The enrollment of members in the different orders for the United States and Canada, for a recent year, was:

Masons	2,401,294
Odd Fellows	2,371,738
Modern Woodmen of America	1,044,979
Knights of Pythias	908,451
Benevolent and Protective Order of Elks	812,657
Knights of Columbus	755,000
Woodmen of the World	646,719
Freemasons	650,000
Loyal Order of Moose	600,000
Improved Order of Red Men	515,311
Fraternal Order of Eagles	450,000
Junior Order United American Mechanics	332,000
Brotherhood of American Yeoman	325,000
Knight Templers	325,000
Knights of Maccabees	267,879
Independent Order of Foresters	176,265
Foresters of America	160,742
Royal Arcanum	135,000
Ancient Order of Gleaners	80,000
Court of Honor	74,371
Tribe of Ben Hur	70,370
Knights of Malta	65,000
Ladies of the Maccabees	55,269
Sons of Confederate Veterans	50,000
National Union	45,000
Nat'l Security League	40,000

Fraud, in the calendar of punishable offences, the false representation of some matter of fact, resulting in the legal injury of another. Any misrepresentation that cannot be guarded against by common prudence is a fraud, and the person committing the fraud may be indicted and punished according to the seriousness of the crime. The courts have been wary of strictly defining fraud, since to do so would be to set limits outside which unscrupulous persons might pursue fraudulent businesses in comparative immunity. Concealment of material circumstances that should be discovered, and taking unfair advantage of an intoxicated or feeble minded person are recognized as fraud by the common law. In courts of equity the crime is less narrowly and precisely defined.

To illustrate: If a party makes a statement of fact, which, as far as it goes, is true, but conceals some other fact which is vital, he is guilty of fraudulent concealment. In other words, there must be an intention to deceive. Negilgence alone, or an assertion of a fact which afterwards turns out to be false, is not fraud, in the strict interpretation of the law, although the negligent party may be subjected to some other liability. This is the understanding of fraudulent concealment both in the United States and England. Again, if a person buys some article carelessly, without making proper examination or questioning the seller, his purchase cannot be said to constitute fraud on the part of the seller.

Fraunhofer, frown'ho-fer, **Joseph** (1787-1826), a German optician of Munich. He was brought up as a maker of looking-glasses and a grinder of lenses. When a young man he held various positions as an instructor in mathematics, but ultimately became a member of a firm of manufacturers of optical instruments. He invented a machine for grinding the surface of an object glass with greater accuracy than can be attained by hand methods. He also designed various improvements in the manufacture of glass for optical purposes. In experimenting as to the best method of producing microscopes and telescopes, he was led to study the spectrum.—the band of light in many colors that is produced by causing a beam of white light to pass through a prism. He made a special study of the dark lines of the spectrum, to which the name of Fraunhofer's lines has been given. His investigations led to the invention of the spectroscope, on which we depend for our knowledge of the make-up of the sun and stars. He dis-

covered and charted the dark lines that occur in the spectrum of sunlight. See COLOR.

Frechette, fra-shet′, **Louis Honore** (1839-1908), a French-Canadian poet. He was born at Point Levi, in the province of Quebec; it is said that he began writing verses when he was eight years old. His father disapproved of his rhyming tendency, and sent him to a seminary in Quebec in the hope that he would forget it. But a sympathetic teacher encouraged him in it and after graduating from Laval University he published, in 1863, *My Leisure Hours,* a volume of verse. The next year he was admitted to the bar, but engaged in newspaper work in Chicago for several years. In 1874 he was elected to the Canadian Parliament, but in five years returned to journalism, editing papers successively in Quebec, Montreal, and Chicago. Mr. Frechette has written among other works *Veronica,* a five-act play; *The Voice of an Exile, Flowers of the North, The Snowbirds, The Legend of a People,* all books of poems; translations of Howell's *Chance Acquaintances* and Cable's *Creole Days* into French, and a single sketch in English called *Christmas in French Canada.* His poems are his most memorable work.

Frederick I (1121-1190), surnamed **Barbarossa,** emperor of the Holy Roman Empire. He was crowned at Aix-la-Chapelle, 1152, and was the leader of the Ghibellines. Like Charlemagne, Barbarossa (the Redbeard) aimed to rule with a firm hand. He raised Bohemia to the rank of a kingdom, and made Austria an independent duchy. He made Poland tributary to the empire. In efforts to assert the imperial authority he came into conflict with the pope repeatedly. Six times Barbarossa led an army across the Alps to straighten out the cities of Lombardy. On one of these expeditions the walls of Milan were razed, and the inhabitants were scattered among the villages. In 1176, a summer pestilence having swept away 25,000 of Barbarossa's soldiery, the cities of the Lombard League flew to arms. Aided by the countenance of the pope and by the alliance of Henry the Lion, Duke of Saxony, the citizens marching on foot won the notable victory of Legnano over the feudal horsemen of Barbarossa. The emperor was glad to escape with his life, and soon afterward recognized the freedom of the Lombard towns. As soon as his hand was free, Barbarossa turned on his false vassal, Henry of Saxony, deprived him of his fiefs, and banished him from the empire.

Barbarossa was a prominent figure in the third Crusade. In 1189 he proclaimed a universal peace in his dominions, placed the crown in charge of his son, and united with Philip II of France and Richard of England to effect the recapture of Jerusalem from Saladin. The crusaders set out with high hopes, but Barbarossa lost his life in fording a river of Syria, and the crusaders fell into jealous dispute, as set forth in Scott's *Talisman.*

Barbarossa was the greatest ruler of the Hohenstaufen line. He strove to exalt the imperial dignity. He fought, but he fought to secure peace and order. He was a patron of learning. He encouraged the University of Bologna—"the university of Roman law." Though he maintained a court of pomp and luxury, he put down local tyranny with a strong hand. He is one of the national heroes of Germany. One of the ancestral castles of the Hohenstaufen family sits on Kyffhäuser, in the Harz Mountains. A tradition lingered long among the peasantry that Barbarossa was not dead, but that he sat in magic sleep upright on a golden throne, crown on head and scepter in hand, deep beneath the castle, and that some day, in an hour of need, he would come forth and bring his people a reign of justice and peace.

See GUELFS AND GHIBELLINES.

Frederick II (1712-1786), better known as **Frederick the Great,** king of Prussia. He was the son of Frederick William I, and the great grandson of the Great Elector. He ascended the throne in 1740. His father was very harsh with him as a boy. On one occasion a young lieutenant was put to death in his presence for having encouraged him in an attempt to run away from his father's court. He was fond of music and painting, and kept up a cor-

respondence with the scholars and writers of the day, particularly Voltaire, whom he invited to his court. Contrary to the expectation of his friends, Frederick developed military ability of a very high quality.

In some respects his career resembles that of Alexander the Great. He found Prussia a small state, but its finances were in excellent condition, and he had at his command the finest army in Europe. These advantages he owed to his stern old father. Frederick engaged in various wars with his neighbors. He robbed Maria Theresa of her Silesian provinces and exacted heavy war indemnities from Austria. He joined Russia and Austria in the division of Poland, taking the northern section for his share. In the famous Seven Years' War England supported him, chiefly with large sums of money, against the French and Austrians.

At his death it could be said of Frederick that he added 30,000 square miles to the territory of Prussia, that he left $70,000,000 in the treasury, and an army of 200,000 of the best drilled soldiers in Europe. German scholars admit his military ability freely, but criticize him severely because he preferred the literature and manners of France to those of his native country. In his *History of Frederick II,* published 1858-65, Carlyle makes out that the Prussian king was one of the most heroic figures in modern history. The citizens of Berlin respect the memory of Frederick. He is their national hero. A bronze statue representing him on horseback stands in Unter den Linden in front of the imperial palace. It is considered the finest equestrian statue in existence.

Frederick was the first European sovereign to acknowledge the independence of the United States. He was not without a certain grim wit of his own. On one occasion he received a written request for assistance from a village pastor who claimed that a rival was drawing all the people to the church on the other side of the river. Frederick turned over the petition and wrote: "Tell him to go and preach on the other side of the river. That will drive them all back again." See MARIA THERESA.

Frederick William (1620-1688), elector of Brandenburg. He is known as the Great Elector. He was a fighter. He succeeded in securing the independence of Prussia from the Poles. He encouraged agriculture, insisted on economy, constructed several important canals, and welcomed the refugee French Huguenots to his dominions. He is recognized as the founder of the future greatness of Prussia.

Frederick William I (1688-1740), king of Prussia. He came to the throne in 1713. He had a passion for military life, yet was concerned in only one war. He had simple tastes, a high temper, and a tremendous will. He dismissed all unnecessary officers from his household, hoarded the public revenues, and built up an army. His famous Potsdam guard was made up of giants collected from the remotest parts of Europe. The building up of this guard was his greatest foible. He paid enormous sums for recruits and even resorted to kidnaping. Several of these men were over seven feet in height. They wore tall fur caps that made them seem even a foot higher.

Frederick VIII (1843-1912), king of Denmark from 1906 to 1912. This popular, democratic, scholarly ruler was the son and successor of Christian IX. King Frederick was educated in Denmark and at Oxford, England. He fought in the War of 1864, but his own reign was peaceful. King Frederick was fond of travel and of intellectual pursuits, and at one time was chancellor of the University of Copenhagen. He was a brother of Queen Alexandra of England and of King George I of Greece, and the father of the ruler who ascended the throne of Norway in 1905 with the title of Haakon VII. King Frederick was succeeded by his eldest son, Christian IX.

Frederick, Maryland, the county seat of Frederick County, is interesting chiefly because of its historic associations, though its industries are not unimportant. The city is situated sixty miles west-northwest of Baltimore on the Pennsylvania and the Baltimore and Ohio railroads. Nearby are the battlefields of South Mountain and Monocacy. Whittier made Frederick fa-

mous as the scene of Barbara Frietchie's well known exploit; and here in 1755 Washington joined forces with Braddock before setting out against the French.

The industrial establishments of Frederick produce tobacco, leather, hosiery, fiber brushes, flour, knitted garments, bricks, canned goods and planing mill products. The state institution for the deaf and dumb is located here, as are the Women's College, Frederick College and St. John's Literary Institute. Here, in Mount Olivet Cemetery, is buried Francis Scott Key, author of *The Star Spangled Banner*. Population in 1920, 11,066.

Fredericksburg, a city of 5,882 inhabitants in Spotsylvania County, Virginia, is 60 miles north of Richmond on the Rappahannock River and on several railroads. The industries of Fredericksburg are of little more than local importance, its most interesting feature being its location near the site of one of the hardest battles of the Civil War—the battle of Fredericksburg.

Here, on December 13, 1862, General Burnside, commanding the Federal Army of the Potomac, 125,000 strong, attacked the Confederate Army of North Virginia, numbering about 78,000 and commanded by General Lee. After his invasion of the North, Lee had returned to Fredericksburg and had taken up a strong position on the bluffs overlooking the city. Burnside was across the river at Falmouth. Crossing the River on December 12, he made six assaults against Lee on the following day, gaining nothing. His loss was about 12,500 in killed and wounded, while Lee lost less than half as many. As a result of this defeat, Burnside was removed from his command.

Fredericton, the capital of the Canadian province of New Brunswick, is situated on the Saint John River, sixty-seven miles northwest of the city of Saint John. This city, which has been the provincial capital since 1788, is served by large steamers on the Saint John, and by the Intercolonial and the Fredericton and Grand Lake railroads. The principal products of its manufacturing plants are boots, shoes and shoe-packs, canoes and motorboats, grist, lumber and concrete building blocks. The city contains, besides primary schools, a high school, the University of New Brunswick, Provincial Normal School and a business college. There are two large hospitals, numerous hotels, and the New Brunswick Experimental Station. In 1921 the population was 8,114.

Free Church, in Scottish history, a large body of Presbyterians, dating from 1843. In that year nearly 500 ministers and their congregations withdrew from the established Presbyterian church. Like the Church of England, the Church of Scotland enjoys large revenues from property owned by the church, and from a system of public taxation for church purposes. The right to public revenue was accompanied, however, by an assumption of authority on the part of the government to appoint the ministers of the various parishes and the professors in the universities. After a long struggle in Parliament to obtain permission for the individual parishes to select their own ministers absolutely free from the interference of higher authority, a large part of the church seceded, as stated. A peculiar condition of affairs ensued. Church buildings with ample revenues were without congregations; the congregations were without revenue or church accommodations. The Free Church of Scotland, as the denomination was called, set to work with determination, however. Churches were built, funds were raised for the assistance of the weaker congregations, departments of theology were established at the universities of Edinburgh, Glasgow, and Aberdeen. At the beginning of the twentieth century the denomination had a membership of half a million and a body of 1,800 ministers. So far as the denominations correspond to the various political organizations, the members of the Free Church are supporters usually of the Liberal party; the established Presbyterians, of the Conservative or Tory party, but the lines are not strictly drawn. See PRESBYTERIAN; CHALMERS.

Free Cities, in German history, a considerable number of towns that in the midst of the confusion of the Middle Ages succeeded in maintaining a more or less com-

plete independence. All were walled towns of commercial importance. In return for contributions to the purse of the reigning king or emperor within whose territory they were situated, the free cities obtained permission to govern themselves through local councils. In the absence of anything like a modern system of taxation, sovereigns were glad to obtain a revenue in this way. These cities were, to all intents and purposes, states, ranking with the grand duchies. Their mayors ranked with the smaller nobility and were entitled to seats in the Imperial Diet. Free from the interference and exactions of rulers, these cities, when not subject to the worse tyranny of local factions, became centers of free thought and expression,—the homes of art and literature. At the time of the French Revolution there were fifty-one free towns including Cologne, Aix-la-Chapelle, Worms, Spires, Augsburg, Nuremberg, and Ulm. Most of these lost their charters during or at the close of the Napoleonic wars. Until the late war, Hamburg, Lubeck, and Bremen were the only free cities. Frankfurt had the bad judgment to side with the Austrians in the war of 1866, and was punished by being reduced to the rank of an ordinary Prussian city. See HANSEATIC LEAGUE.

Free Lances, mercenary soldiers of the Middle Ages. After the wars of the Crusades numerous bands of adventurous spirits were left without a regular occupation. For a century or two they gathered in bands of free lances, or free companions, as they sometimes called themselves, selling their services for plunder and hire to any that had occasion for them. The local feuds of northern Italy, in particular, gave opportunity to ply their trade. A hundred years before the discovery of America the free lances of France were so numerous and so powerful that they defeated the king's forces in open battle.

Free Masonry. See MASONS; FRATERNAL ORGANIZATIONS.

Free Methodists, a religious body organized in Pekin, N. Y., in 1860. Its founders separated from the Methodist Episcopal Church, because they were not in full harmony with its teachings. The former name of the sect was Nazarites. In a general way there was an effort to go back to the old idea of Methodism. The sect has two seminaries, one at Spring Arbor, Mich., and one at North Chili, N. Y. Recent statistics show that the organization has 1,161 churches and 36,147 communicants.

Freeport, a city and county seat of Stephenson County, Illinois, is on the Pecatonica River, and on the Illinois Central, the Chicago & Northwestern and the Chicago, Milwaukee & St. Paul railroads, 121 miles west of Chicago. There is interurban connection with Rockford.

The city has a public library, several banks and hospitals, a Federal building and a fine Y. M. C. A. building. The streets are well paved and electrically lighted. The chief industries include the manufacture of automobiles, engines, hardware, windmills, agricultural implements, pianos, organs, medicines and toys.

Freeport was settled in 1835 and incorporated in 1859. Population, 19,669.

Free-Soil Party, in United States history, a short-lived anti-slavery party of 1848-55. It united various elements known as the Liberty party, the Conscience Whigs of Massachusetts, and the Barnburners of New York. Its first candidate for the presidency was Martin Van Buren. Its platform declared that Congress had no more power to make a slave than to make a king, and that slavery ought to be kept out of the territories. The battle cry of the campaign was "Free soil, free speech, free labor, and free men." Though the party did not expect to elect the president, it polled 291,263 votes and elected fourteen congressmen in New York, Massachusetts, and Ohio. Four years later the Barnburners returned to the fold of the regular Democracy. In 1856 the rest of the Free-Soilers were absorbed by the newly formed Republican party. See REPUBLICAN PARTY.

Free Trade, the policy of allowing goods to be imported or exported without the payment of special taxes. It is opposed to the system of protection. By the Constitution of the United States the various states of the Union are forbidden to

lay duties on goods imported from another state of the Union. The general government, however, is authorized to levy a tariff on articles imported from abroad. The leading free trade nation of the world is the United Kingdom of Great Britain and Ireland. Adam Smith, the Glasgow professor, advocated free trade in his *Wealth of Nations* published in 1775. Ricardo, a London banker whose works were extensively read, endeavored to convince the British public that the nation would be the gainer in the long run if the policy of free trade was adopted. William Pitt was a free trader. Richard Cobden and John Bright favored free trade. In 1869 Gladstone framed a free trade policy on a large scale. At the present time, 1910, the world at large is permitted to market its productions at British wharves as freely as though they were produced on British soil. Slight exceptions must be made to this statement, however. To discourage shipment abroad, an export duty is laid on coal. Imported tobacco, tea, rum, brandy, wine, coffee, currants, raisins, cocoa, sugar, and a few other articles pay an import duty, purely to provide the government a revenue, not for "protection." See CUSTOMS.

Freedmen's Bureau, in American history, a branch of the war department in existence from March 3, 1865, until 1870. It was established by Congress to have general charge of the interests of the negroes of the Southern States. Part of the work of the bureau consisted in assigning former slaves allotments of confiscated or abandoned lands. It also engaged in the establishment of schools for the education of colored people. Something over $15,000,000 of government funds was expended through the medium of this bureau. See CONTRABAND.

Freeholder, in English and American law, one who owns real estate, as distinguished from a tenant or renter. In feudal times a freeholder was one who held land on honorable terms as fealty, and the payment of a small sum. The feudal freeholder was not held for military service, nor was he due for menial service. A freeholder was neither a knight nor a villein.

Freeman, Edward A. (1823-1892), a noted English historian. He was a graduate of Oxford University, and in 1873 he became professor of modern history in that institution. A list of his published works includes over thirty titles. Among these are several volumes on cathedral architecture and various antiquities. His most famous book is *The History of the Norman Conquest.* Other works are *Growth of the English Constitution, Historical Essays, The Ottoman Power in Europe, Methods of Historical Study.* Mr. Freeman was a patient investigator, a man of immense learning, a seeker for truth, a pugnacious opponent, a persistent glorifier of the Teuton, and a man of the highest and kindliest character. In 1863 his reputation for sagacity as a historian received a severe shock in the United States. In this year he published the first part of a work entitled *The History of Federal Government from the Achaean League to the Disruption of the United States.* Americans, acting on the principle that "the wish is father to the thought," have never forgiven him fully for believing that the experiment of a free government in the New World had proved a failure; when, as a matter of fact, Freeman was one of the Stuart-Mill group of ardent Northern sympathizers,—but he had lost hope. The wish was *not* father to the thought, any more than with Hawthorne, who publicly despaired at about the same time. We are indebted to Freeman's scholarly pages for a number of pertinent extracts.

Freeman, Mrs. Mary Eleanor Wilkins (1862-), an American novelist. She was born in Randolph, Massachusetts. She was educated at Mount Holyoke Seminary, and has spent her life in Vermont, Massachusetts, and New Jersey. In 1886 her short stories of New England life began to attract attention. Her ability seems to lie in selecting some life, barren and forlorn in external circumstances, and arousing interest and sympathy, not on account of these circumstances, but in the mental, moral, or spiritual development of the individual. She does this so artistically as to seem artless. She uses Anglo-Saxon words and short sentences, and seems to make bare statement of the barest

facts; but her characters stand out like photographs. A sense of humor, an insight into human motives, and a sympathy with the joys and sorrows of common lives have given her the power which places her in the front rank of American short story writers. *A Humble Romance, A Conflict Ended, A New England Nun,* and *A Village Lear* are among the best of these stories. Mrs. Freeman is the author of several novels of varying merit. *Madelon* is a romantic tale, involving some character study. *By the Light of the Soul* is the unhappy story of a motherless girl, who, with no guide but the "light of her soul," makes mistakes which border on the ridiculous and bring their conscientious perpetrator into no end of difficulty and misery. The story is morbid and unnatural. *The Portion of Labor* is as different from the preceding as it is possible for two stories of persons living in the same state of society to be. It is a labor problem tale. Strong, fine, suggestive, it presents forcibly the idea suggested by the title that to each individual belongs a share of the work of the world. The commonplace man who in the gradual development of this thought finds satisfaction in his life of hardship and struggle seems, for himself at least, to have solved the problem of life and of his relations to his fellow man. Mrs. Freeman's writings include *Jane Field, Pembroke, Jerome, A Poor Man, Fair Lavinia and Other Stories, Love of Parson Lord and Other Stories, Six Trees,* and *The Givers.*

Frémont, John Charles (1813-1890), an American soldier. He was born in Savannah, Georgia, and was educated at Charleston, South Carolina. He served in the United States navy, then obtained a position in the United States corps of topographical engineers. He married Jessie Benton, daughter of the celebrated Senator Benton of Missouri. As a commanding engineer in the service of the United States, he conducted a number of exploring expeditions in the then unknown region of the Rocky Mountains. He crossed the continent no less than five times, discovering the passes now traversed by railroads and noting sites desirable for military posts. In 1844-5 he explored the region of Utah. In 1846 he coöperated with Commodore Stockton in the conquest of California. In 1848 he explored a route from Santa Fé to Sacramento. These various expeditions made him famous as "the Pathfinder." His name has been perpetuated in various cities and counties of the West. Despite his Southern birth and education, he was an ardent anti-slavery man. In 1856 the newly formed Republican party made him its first candidate for the presidency. In 1861 he commanded in Missouri. He exceeded his instructions by freeing slaves prematurely, and was, by order of President Lincoln, removed from his command. The following quotation from Whittier, written at a time of intense feeling on both sides, gives a glimpse, however, of the sentiment among the anti-slavery people of New England:

Thy error, Fremont, simply was to act
A brave man's part, without the statesman's tact,
And, taking counsel but of common sense,
To strike the cause, as well as consequence.

Fremstad, Olive, an operatic soprano, was born in Stockholm, Sweden, and came as a young child to the United States with her parents, who settled in Minneapolis. She was a music teacher for several years, and later went to Europe to study under Lilli Lehmann of Germany. Her first appearance in opera was as Azucena in *Il Trovatore,* at Cologne. She has since appeared in the principal opera houses of the United States and Europe. Her voice is dramatic and powerful, and her chief roles are Wagnerian. She has sung the roles of Isolode, in *Tristan and Isolde,* Brunhilde, in the *Niebelungen Ring,* Kundry, in *Parsifal,* etc. Mme. Fremstad has also sung in French and Italian operas, in the roles: Venus, La Tosca and Salome.

French. See LANGUAGE.

French, Alice (1850-), an American story writer, better known by her pen name of Octave Thanet. She was born in Andover, Massachusetts, but has spent the greater part of her life in Iowa and Arkansas. Her strong, dramatic short stories have found a large number of readers as they have appeared in the magazines. Many of them have been collected into book form, among which may be men-

tioned *Knitters in the Sun, Otto, the Knight, and Other Trans-Mississippi Stories, Stories of a Western Town, We All, A Book of True Lovers,* and *Man and His Neighbors.* Miss French's stories appeal to a wide class of readers. They are Western tales of simple lives, naturally told. They contain a little pathos, much humor, and are full of human interest. That she is capable of the sustained effort necessary for a successful novel Mrs. French has proved in *The Man of the Hour,* a labor-problem story, absorbing and inspiring.

French, Daniel Chester (1850-), an American sculptor. He was born in Exeter, New Hampshire, and received his education in Boston and in Florence, Italy. He has had studios in Boston, in Concord, New Hampshire, and in New York City. His most celebrated works are *The Minute Man of Concord, Dr. Gallaudet and His First Deaf Mute Pupil, John Hancock, Lewis Cass, Death and the Young Sculptor,* the *Statue of the Republic* and *Death and the Sculptor.*

French, Sir John Denton Pinkstone (1852-), a distinguished English soldier, commander-in-chief of the Expeditionary Forces in France during the chaotic days of 1914-15. He was born at Ripple Vale, Kent, England. Entering the British navy in 1866, he served as naval cadet and midshipman for 4 years. In 1874 he entered the army and served through the Soudan campaign. During 1893-94 he was assistant adjutant-general of cavalry; and in 1895-97, assistant adjutant-general at army headquarters. Sir John served in Natal in 1899, and commanded a cavalry division in South Africa in 1900. During the South African campaign he was mentioned in despatches eight times. In 1907 he was promoted to the rank of general, and in 1913 to that of field-marshal. Sir John commanded the Expeditionary Forces in France, but was succeeded by Sir Douglas Haig. During 1915-18 he was in command of the home forces. In reward for his services he was elevated to the peerage, and he holds military medals from Russia, France and Britain. During 1918-21 Sir John was Lord Lieutenant of Ireland.

French and Indian War, the name usually given to the struggle in America between the French and English (1754-60), roughly coincident with the Seven Years' War in Europe. The French, who were in possession of Canada and Louisiana, by the occupation of different points in the interior with military posts and protected trading posts, tried to confine the English to a narrow territory on the Atlantic coast, while they themselves planned to take the land of the Ohio basin and that surrounding the Great Lakes. The territory in dispute included that along the Ohio river, both the French and the English laying claim to it. The French based their claims upon the alleged effect of a settlement at the river's mouth, while the English insisted that their king's grants of land from "sea to sea" became valid when the coast line was permanently occupied. The land claimed by both was not settled, although a small settlement of Virginians was established on the Monongahela and settlements in Ohio were planned.

The Governor of Virginia had organized a force to defend the western frontier, and hostilities began in May, 1754, when Washington attacked a French force under Jumonville. In 1755, General Braddock, at the head of a detachment of Virginia troops, tried to capture the French Fort Duquesne, but in this he was defeated by the French. The French retained control of the territory and Fort until 1758. In the Battle of Ticonderoga they defeated the British, but this was their last victory, for shortly afterwards the English captured Louisburg, Fort Frontenac on Lake Ontario, and Fort Duquesne. This was followed by the capture of Ticonderoga, Crown Point and Fort Niagara. On Sept. 13, 1759, the forces of General Wolfe defeated the army of Montcalm which was defending Quebec, whose surrender followed, and in September, 1760, control was gained of Montreal and the rest of Canada.

Peace was not made until the Seven Years' War on the Continent was at an end. In the Treaty of Paris in 1763, France ceded Canada to England, and

England received from Spain the Floridas, which she held until 1783, while Spain received Louisiana from France, and so France lost her American possessions.

See QUEBEC, BATTLE OF.

French Literature. See LITERATURE.

French Revolution, a revolution that took place in France at the close of the eighteenth century. The meeting of the States General May 5, 1789, may be regarded as the beginning. The close may be considered either as the end of the Convention in 1795, or the end of the Directory in 1799, or the end of Napoleon's consulate in 1804. It is considered the most remarkable revolution in the world's history. One writer goes so far as to suggest that millions of years hence, of all the political topics that now fill our histories, the Trojan War and the French Revolution will be the only events that will be worth considering. The English Revolution was a mere incident at the close of which the current of British history resumed its wonted course. The American Revolution, relatively, was a mere assumption of local government. The French Revolution was something more. A powerful nobility, long intrenched in privileged power and wealth, was overturned suddenly; and not only overturned, but practically annihilated. The common people, long oppressed and ignored, assumed the reins of government.

At the time of the Revolution there were in France about 25,000,000 people. There were two privileged classes,—the nobles and the clergy. They numbered together about a quarter of a million. They owned half the soil of France; they owned the castles, chateaux, churches, and buildings of note. In addition to their own vast wealth, they squeezed out of the peasants three-fourths of all they produced. The peasant was obliged to work for his superiors without pay. He couldn't pass over a road with a sack of grain without paying toll. The privileged orders held the offices and enjoyed all the revenues of the government. They themselves were practically exempt from taxation. Forty thousand humble priests labored among the villagers. They lived on a mere pittance, and were of the people; but the higher places in the church were filled, with few exceptions, with the younger scions of the nobility. They left their proper work to hired assistants, and used the vast incomes from church property to maintain a social standing among their relatives. In the rural districts the peasants lived at times on wretched bread made of ground acorns, bark, and bran. Their little crops were destroyed by rabbits and pheasants and deer, which they were forbidden on pain of death either to molest or kill. Local famines were frequent. The peasants died off by the thousand, as is now the case in Russia. The working people in the cities huddled together and starved in wretched cellars and attics,—"sullen masses of rags and misery." Twenty-three million wretched, poverty stricken, hopeless, social drudges, with little to wear and less to eat, supported a million people in luxury. Between these extremes was a third class of well-to-do shopkeepers, lawyers, doctors, bankers, and men-of-letters. They are known in French history as *bourgeoisie (bo͝or-zhwä-zē′)*. The leaders of the Revolution came for the most part from this class, reinforced, to their credit be it said, by a remnant of the nobility, like Lafayette.

For two centuries the government of France had been despotic. Expensive wars and general extravagance, such as the building of palaces like Versailles, had drained the royal treasury. The misery and thriftlessness of the common people made it impossible to extort more money. The nobility and clergy, the great property owners, were exempt from taxation. The financial affairs of the nation went from bad to worse. The government ran behind $10,000,000 a year. Later the deficit grew to $25,000,000 a year. In this extremity, Louis XVI summoned a meeting of the Notables, an ancient legislative body representing the nobility. He asked this assembly to consent to the taxation of the privileged classes. The Notables refused. The king sent them home. He then summoned a meeting of the States General. This was a general parliament which had not met since 1616, nearly two centuries. It represented all three estates, the nobility, the clergy, and the common people. In the meantime

the writing of such men as Diderot, Voltaire, Rousseau, Sieyes, and the influence of the American Revolution, had aroused the thinking people of France to the notion that something desperate must be done. When the States General met, the king and the aristocracy desired that the members sit in three distinct houses or bodies,—the nobility, the clergy, and the third estate. The delegates of the third estate, that is to say, the common people, saw clearly that it would be vain for their chamber to pass a useful measure, because it would be voted down by the other houses. The third estate insisted, therefore, that the entire States General should sit as one assembly. They were in the majority. They had determined leaders and carried their point. Many of the clergy fell in and later the nobility began to fall into line. This new parliament was called the National Assembly. This was the beginning of the French Revolution.

Moderate men desired to reform the government by providing for regular sessions of the States General and for equal taxation; but the Revolution once started soon swept beyond their control. At the prospect of relief, hatred engendered by decades of cheating and starving and beating and maiming transformed the peasantry into veritable fiends. Wretched bands of peasants armed with flails and clubs rose in revolt. They ran in delirious joy from estate to estate. They set fire to the châteaux of their former oppressors. They pillaged and plundered everywhere. The poor of Paris rose in revolt. Men of violence obtained control of the Assembly. The king and queen were hurried to the scaffold. A thousand nobles were put to death with scant formality, and thousands of others were cut down in cold blood or driven from France forever. The French republic was proclaimed. The watchwords were liberty, fraternity, and equality. A dictatorship was appointed. The army was charged with the defense of the young republic and the liberation of the Italian cities from Austrian domination. As the need of an efficient leader became evident Napoleon was appointed consul. In 1804 he caused himself to be proclaimed emperor. After Waterloo came the Bourbons; after them came Napoleon III.

For a time it seemed as though France had lost politically all that the Revolution had gained; but in reality great gains had been made. The nobility had been suppressed effectually. More just ideas of public taxation had taken root. With the lifting of burdens and the security of property the common people became more prosperous. At the close of the Franco-Prussian War the French republic was proclaimed. In a real sense the French Revolution may be said to have come to a close, then, in 1871.

France was girdled with foes. The Empire, Prussia, and Sardinia were in arms; Naples and Spain were soon to join the coalition; Sweden and Russia both offered to do so, if they were needed. In July a Prussian army, commanded by old officers of Frederick the Great, crossed the frontier; and two Austrian armies, one from the Netherlands and one from the upper Rhine, converged upon the same line of invasion. The French levies were outnumbered three to one. Worse still, they were utterly demoralized by the resignation of many officers in the face of the enemy and by a justifiable suspicion that many of those remaining sympathized with the invaders. Within France were royalist risings and plots of risings; and the King was in secret alliance with the enemy. There is no doubt now that the Queen had even communicated the French plan of campaign to the Austrians.

. . . . . .

After August 10, Danton became the leading member of a provisional executive committee, and at once infused new vigor into the government. "We must dare," his great voice rang out to the doubting Assembly, "and dare again, and ever dare,—and France is saved!" In this spirit he toiled, night and day, to raise and arm and organize recruits. France responded with the finest outburst of patriotic military enthusiasm the world has ever seen in a great civilized state. September 20 the advancing Prussians were checked at *Valmy;* and November 9 the victory of *Jemmapes,* the first real pitched battle of the war, opened Belgium to French conquest. Another French army had already entered Germany, and a third had occupied Nice and Savoy.

These successes of the raw but devoted French soldiery over the veterans of Europe intoxicated the nation, and called forth an orgy of democratic enthusiasm. The new National Convention became, in Danton's phrase, "a general committee of insurrection for all nations." Flamed out one fiery orator,—"Despots march against us with fire and sword: we will bear against them liberty!" The Convention ordained a manifesto in all languages, offering the alliance of the French nation to all peoples who wished to recover their liberties; and French generals, entering a foreign country, were ordered "to abolish serfdom, nobility, and all monopolies and privileges, and to

THE GIRONDISTS ON THE WAY TO THE GUILLOTINE
From the Painting by Carl Piloty

aid in setting up a new government upon principles of popular sovereignty."

Starving and ragged, but welcomed by the invaded peoples, the French armies sowed over Europe the seed of civil and political liberty. The Revolution was no longer merely French. It took on the intense zeal of a proselytic religion, and its principles were spread by fire and sword.—West.

All France and whatsoever it contains of men and resources is put under requisition. The republic is one vast besieged city. . . . The young men shall go to battle; it is their task to conquer; the married men shall forge arms, transport baggage and artillery, provide subsistence; the women shall work at soldiers' clothes, make tents, serve in the hospitals; children shall scrape old linen into surgeon's lint; the old men shall have themselves carried into public places, and there, by their words, excite the courage of the young and preach hatred to kings and unity for the Republic.—Committee of Public Safety, Proclamation of August 23, 1793.

In this humor, then, since no other will serve, will France rush against its enemies; headlong, reckoning no cost, heeding no law but the supreme law, Salvation of the People. The weapons are all the iron there is in France; the strength is that of all the men and women there are in France. . . . From all hamlets toward their departmental town, from all departmental towns toward the appointed camp, the Sons of Freedom shall march. Their banner is to bear "The French People risen against Tyrants." . . . These soldiers have shoes of wood and pasteboard, or go booted in hay-ropes, in dead of winter. . . . What then? "With steel and bread," says the Convention Representative, "one may get to China." The generals go fast to the guillotine, justly or unjustly. . . . Ill-success is death; in victory alone is life. . . . All Girondism, Halfness, Compromise, is swept away. . . . Forward, ye soldiers of the Republic, captain and men! Dash with your Gallic impetuosity on Austria, England, Prussia, Spain, Sardinia, Pitt, Coburg, York, and the Devil and the World!

See accordingly on all frontiers, how the "Sons of Night" astonished, after short triumph, do recoil; the Sons of the Republic flying after them, with temper of cat-o-mountain or demon incarnate, which no Son of Night can withstand. —Carlyle, *French Revolution*.

RESULTS OF THE FRENCH REVOLUTION.

With the overthrow and exile of Napoleon the old Bourbon dynasty returned to the throne of France. It was a million foreign bayonets, and not the voice of the French people, that restored Louis XVIII. And the nobles who had for a quarter of a century been lurking in foreign lands or serving against France in foreign armies now trooped back to their own; and their own received them not. The old *regime* was gone forever. The Revolution had altered the face of society in France, and the Bourbons, who "learned nothing and forgot nothing," found themselves in a new world.

For, in truth, the convulsions and horrors so prominent on the pages of history were but the temporary incidents of the great Revolution. The movement for reform at its inception was, in the main, in the hands of prudent and high-minded men. It was its misfortune that the control of things slipped away from them and was grasped by the mob. The destruction of religion and education was only for a time, and Jacobin violence was in turn soon restrained by reason and law.

The changes in France naturally were striking. And the most of them may be summed up in the one word, *equality*. All exclusive privilege was swept from the soil of France as by a flood. A quarter century since 1789 had seen a new generation grow up which never knew the exemptions and monopolies of the old *noblesse*. And they could not be restored. The Church, too, and the merchant gilds, had lost their special rights. All Frenchmen were equal before the law.

Preferment in the civil service and in the army had too long been open to merit for a return to the old restriction to members of noble families. Massena, general of the republic and marshal of the empire, had been a private in the ranks. Murat, the incomparable leader of cavalry, marshal of France, and king of Naples, had been a waiter in an inn. The Gascon, Bernadotte, had become king of Sweden. And these cases were typical. The privilege of serving France in posts of honor belonged to all Frenchmen who could prove ability; and noble birth was no longer such proof.

The vast body of land that formerly belonged to the Church and the nobles had been appropriated by the State and sold. The titles had passed through many hands since 1793, and it was obviously as impracticable to restore the soil to its original owners as it would have been to undo the confiscations of the first Frankish conquerors of Gaul. The soil now belonged to its cultivators. There was freedom of agrarian contract for all classes, and the practical effect had been greatly to intensify the tendency to the breaking up of large estates; small peasant holdings became common.

No inequality of the old *regime* was more indefensible or more exasperating than the capricious incidence of taxation. The exemptions which formerly belonged to the nobles and clergy had disappeared. Taxation was uniform throughout the nation, and it would have been as hopeless to attempt to bring back the old unjust system as it would be to essay the reconstruction of an extinct geologic age.

The condition of the working classes had been greatly improved; wages had been raised on the average, estimated in purchasing power, to some two or three times what they had been before the Revolution; and in the country the peasants were now owners of the soil. The destruction of the old feudal restrictions and the equalization of taxation had given a better chance to the proverbial thrift of the French industrial masses,

of which they had availed themselves eagerly and successfully. Here was a vast social revolution in itself, and one that could not go backward.

The old idea of vested property interests in public office, so that one might buy and sell and inherit a judgeship, for instance, had disappeared; and all sinecure offices, so numerous under Louis XVI, had also been destroyed. An exact and uniform system of law courts had been created, with regular appeal to a supreme body at Paris; and the law administered had also been made equal. The tangle of customs and conflicting statutes which excited the derision of Voltaire had been replaced by the systematic Codes which made law the same everywhere in France, and which at the same time made justice inexpensive and speedy.—Harry Pratt Judson, *Europe in the Nineteenth Century.*

Freneau, frĕ-nō′, **Philip** (1752-1832), an American poet of Revolutionary times. Freneau was born in New York City of French parentage. A graduate of Princeton, a school teacher, a student of theology and of law, a sea captain, an editor, a supporter of the cause of liberty during the Revolution,—his was a long and active life.

Freneau belongs to the same period as Joel Barlow. His satires and journalistic writings excited a powerful influence during the Revolution, but have ceased to be of interest. His political poetry—his satires were in verse—is keen, original, and vigorous almost to roughness. He is sometimes called the "noisy sailor" on account of these characteristics. Freneau wrote a few lyrics, however, which possess the beauty and grace of true poetry. Among these should be mentioned *Eutaw Springs, The Wild Honeysuckle,* and *The Indian Burying Ground.* Critics regard him as the one writer of the Revolutionary period who deserves the name of poet. A stanza or two will give a glimpse of his ability in lyric poetry, and of his humor. The first stanzas satirize the New England Puritans:

These exiles were formed in a whimsical mould,
And were aw'd by their priests, like the Hebrews of old,
Disclaim'd all pretences to jesting and laughter,
And sigh'd their lives through, to be happy hereafter.
On a crown immaterial their hearts were intent,
They look'd towards Zion, wherever they went,
Did all things in hopes of a future reward,
And worry'd mankind—for the sake of the Lord.

By midnight moons, o'er moistening dews,
In habit for the chase arrayed,
The hunter still the deer pursues,
The hunter and the deer—a shade!
—*The Indian Burying Ground.*

At Eutaw Springs the valiant died:
Their limbs with dust are covered o'er;
Weep on, ye springs, your tearful tide;
How many heroes are no more! . . .

They saw their injured country's woe,
The flaming town, the wasted field;
Then rushed to meet the insulting foe;
They took the spear—but left the shield.
—*Eutaw Springs.*

Fresco. See PAINTING.

Fresno, Cal., the county seat of Fresno County, is beautifully situated in the center of the San Joaquin valley, one of the richest agricultural districts in the state. It is about 209 miles southeast of San Francisco.. Oranges, grapes, olives and other fruits are raised in the valley, and the annual trade in raisins alone approximates $5,000,000. Wheat, sheep and horses are also extensively raised, and in the city are manufactured barrels and casks, flour, boxes and macaroni. The University of California has here an irrigated experimental farm called Kearney Park. The city has wide, shaded streets, beautiful buildings, a Carnegie library and splendid public schools. The population was 44,616 in 1920.

Freud, Sigmund (1856-), an Austrian physician and the originator of the psychoanalytic method of studying man and treating his mental ills, was born at Freiberg, Moravia, and studied medicine and psychology at Vienna. Receiving his doctor's degree in 1881, Herr Freud accepted a position on the teaching staff in 1885, was made extraordinary professor in 1902 and ordinary professor in 1919. For a time, 1885-6, Professor Freud worked in Paris and there devoted himself to an intensive study of nervous cases. As a result of his study, he and the Viennese physician Breuer originated a method of treating nervous cases which they called catharsis, and which consisted, essentially, of hypnotizing the patient and then examining the causes of the nervous illness. After a few years, Professor Freud struck out for himself and originated the well known psychoanalytic method. He is an indefatigable investigator and writer. Among his works that have

been translated into English are, *A General Introduction to Psychoanalysis, Three Contributions to the Theory of Sex, History of the Psychoanalytic Movement, Wit, and Its Relation to the Unconscious, Totem and Taboo, On Dreams, Dream Psychology, Psychology of Everyday Life, Reflections on War and Death,* and *Delusion and Dream.* See PSYCHOANALYSIS.

Frey, in Scandinavian mythology, the god of rain and sunshine, of the fruitfulness of the earth, of peace and prosperity. Frey climbed one day into Odin's seat. While there he beheld in Jotunheim a beautiful maiden, Gerd, with whom he fell deeply in love. He sends Skirner, his messenger, to see if she may be won. Now Jotunheim is the home of the Frost Giants. Gerd is cold and proud. She is protected in her home by fierce dogs. She will not go. Skirner offers her eleven beautiful apples and a wonderful ring that every ninth night drops eight other rings. Finally he uses magic. At last Gerd is won. The wooing of Gerd is one of the beautiful stories of the northern mythology. The legend is thought to be symbolic. Gerd is the seed; Skirner, the air; Frey the sun shine and rain. Jotunheim is the cold earth from which the seed must be brought out into the light.

Freya, in Scandinavian mythology, the goddess of love. She is the daughter of Niörd and sister of Frey. She excels in beauty and grace, and watches over lovers. Friday is named in her honor and was formerly the most fortunate day in the week. The Crucifixion occurring on that day led to its being regarded as unlucky. Although the goddess of love, Freya was herself deserted by her husband, it is said because she cared more for finery than she cared for him. In Matthew Arnold's poem, *Baldur Dead,* Freya is described as searching for her lost mate. See FRIGG.

And Freya next came nigh, with golden tears;
The loveliest goddess she in Heaven, by all
Most honour'd after Frea, Odin's wife.
Her long ago the wandering Oder took
To mate, but left her to roam distant lands;
Since then she seeks him, and weeps tears of gold.
Names hath she many; Vanadis on earth
They call her. Freya is her name in Heaven.

Friar Tuck, in the Robin Hood ballads and legends, a vagabond monk. Scott introduces him into *Ivanhoe* as the friar of Robin Hood's band. He wears a russet habit, a red girdle with gold tassels, and red stockings. Friar Tuck is a merry fellow, fond of wine, feating, and song. See ROBIN HOOD.

Friction. See MACHINE.

Friday, the sixth day of the week. The name was given by the Anglo-Saxons in honor of their goddess Freya, who corresponds in Teutonic mythology, to the Roman Venus or goddess of love. Among the Turks, Arabs, and other Mohammedans, Friday is the Sabbath, or day of rest. Among Christians Good Friday is the Friday preceding Easter Sunday. See FREYA.

Friends, a religious society. They are commonly called Quakers. The denomination had its rise in England about the middle of the seventeenth century, largely through the preaching of George Fox, who is considered the founder of the sect. At that time the Church of England persecuted all who did not conform to its worship. In 1656, according to the account of Fox, there were over 1,000 Friends in prison. Many died in prison; others were sold into slavery; others died from mob violence. The crimes of which they were accused were such as refusal to pay church tithes, to take oath in court, and to remove their hats. They disturbed the public peace by preaching in open places, and broke the Sabbath by traveling beyond the bounds of the parish to remote places of meeting. In 1656 two Quaker women came to New England. They were imprisoned and sent back. Others could not be deterred from coming. Although the Puritans had themselves been persecuted by the Church of England they were none the less indignant that the Quakers should follow them into their retirement in the New World and make trouble. Prejudice was so strong that men and women were stripped to the waist, tied at the cart's tail, and whipped publicly through the streets. Four Quakers, one of them a woman, were hanged on Boston Common. In spite of persecution, however, the Quakers increased throughout New England. In 1681 the colony

of Pennsylvania was founded by William Penn, largely as a place of refuge for oppressed Friends. The population of Philadelphia still shows traces of the original Quaker stock. It has been called the Quaker City. At the present time the various societies of Friends number about 140,000 members. About four-fifths of these are in the United States. There are about 20,000 in England, Ireland, and Australia.

Plain living, sobriety in dress, industry, thrift, and shrewdness are the traditional characteristics of Friends. They decline to take oath, interpreting literally Christ's injunction, "Swear not at all." They do not believe in a paid ministry. Their meetings are conducted in silence unless someone feels impelled to deliver a message—to speak. Consistent Quakers refuse to perform military service. They speak of first day, second day, third day, etc., refusing to use the heathen names of the days of the week or of the month. Marriage is celebrated by the joining of hands in the presence of witnesses. No sacraments are celebrated. They believe in the baptism of the Holy Spirit, and in communion of the soul with its Maker, but not in outward baptism and the Lord's Supper. The basis of their teaching is a belief that, in religious matters, each soul is illumined directly by the Holy Spirit and stands face to face with its Maker without the need of either priest or intermediator.

Frieze, frēz, a heavy woolen fabric with a long, rough nap, used for overcoats, cloaks, and jackets. The best frieze is of Irish manufacture, and has a world-wide renown. The Irish frieze is impervious to water, and is extremely durable. It is made of the longest and strongest wool. It is dyed in the mass, and is doubled when spun, so as to resemble knitting yarn. The cloth is well fulled, and is finished with a shaggy nap. Medium and cheap grades of frieze are made in this country. They are woven double and are fulled and finished with a shaggy nap. Large quantities of flock are used in the fulling process to give extra bulk and warmth to the fabric. See FLOCK; FULLING; DOUBLE CLOTH.

Frieze, frēz, in architecture, that part of an entablature that is between the architrave and the cornice. The frieze may be a flat surface or it may be divided by partitions into panels. The Greek frieze in its severest form was plain, but ordinarily the frieze was ornamented with figures in relief. A frieze of the Athenian Parthenon, two-thirds of which is preserved in the British Museum, was 524 feet in length. It was originally forty feet from the ground. It is adorned by a sacrificial procession in low relief. From its use in architecture the term has been adapted by potters and silversmiths to denote an ornamental band on vases and cups, especially if used as a ground for figures. Decorators apply the name to an ornamental border running around the wall of a room near the ceiling.

Frigate (frig'at) **Bird,** a web-footed bird of the pelican family. It has a small, slender body with long, pointed wings, 7 feet in length and a deeply forked tail. The plumage is black glossed with green. The bill is longer than the rest of the head, and is sharply hooked at the end. The total length is forty inches; the extent of wing, seven feet. The frigate bird inhabits the coasts of intertropical seas. It nests on stony cliffs or sometimes builds a platform of twigs in trees. The nest contains but a single, chalky white egg. The bird ashore is awkward. Its legs are so short as to seem deformed. It is a swift, graceful, straight flyer, extending its search for food sometimes to a distance of 1,000 miles from land. It is seldom known to dive, but snatches its prey from the surface of the sea or catches flying fishes in their flight through the air above the water. In some localities the frigate bird leads a life near the shore and obtains its food by forcing the gannets and terns to give up the fish they have brought from distant fishing grounds. In case of reluctance to give up their hard won earnings, the active pirate uses beak and wing in a lively manner to over-persuade the "honest fisher folk." Other names for the frigate bird are the man-of-war bird and the man-of-war hawk. See CORMORANT; BIRD; PELICAN.

Frigg, or **Frigga,** in Scandinavian mythology, the wife of Odin and queen of the gods. Half the fallen in battle belong to her. Frigg is frequently confused with Freya, but they are two distinct goddesses. Frigg is the mother of Baldur the Beautiful. She spins with a golden distaff. She knows the future, but never reveals it. She understands also the language of plants and animals. She presides over marriages and love in its highest form. Frigg's chariot is drawn by cats. She has two maids, one to guard her jewels, one to befriend the needy. Gna, her messenger, rides on a winged horse. See FREYA.

I fly not, nor do drive, but hurry fast,
Hoof-flinger swift thro' clouds and mist and sky. —Eddas.

Frobisher, Martin, an English navigator. He was a native of Yorkshire, but of Welsh ancestry. In 1576 he commanded an expedition in search of the northwestern passage. One of his sailors brought home a piece of ore supposed to contain gold. Frobisher was sent out twice thereafter in search of the precious metal, but the ores brought home on his ships proved worthless. He served honorably in the conflict with the Great Armada. He died in 1594. Frobisher Bay on the southern end of Baffin Land was named in his honor.

Froebel, frö'bel, **Friedrich** (1782-1852), the founder of kindergartens. He was born in the rural quiet of a village parsonage in Thuringia, April 21, 1782. At the age of one year he lost his mother. Although a stepmother took her place he grew up a shy, wandering, lonely child, with the feeling that he was neglected,—that no one cared for him. The worthy pastor was not a man of means, but he sent his son to the University of Jena, aiming, with little success, to fit him for an official position in the department of agriculture or of forestry.

Left by the death of his father to rely on his own efforts, Froebel became a tutor, but carried on studies with a view to architecture. At the suggestion of the director he became an instructor in a Frankfurt school. One summer Froebel took his pupils on a fourteen day tramp, each boy carrying his own knapsack, to visit Pestalozzi at Yverdon, a Swiss village beyond Berne. The boys studied geology, birds, and flowers. The two men formed an acquaintance that has linked their names for all time. In 1807 Froebel accompanied two lads to Yverdon in the capacity of tutor and with them became an inmate of Pestalozzi's school. In 1811 he went to the University of Göttingen, and later to Berlin to fill in certain gaps, of which he felt conscious, in his education.

In 1813 he joined the army enlisted to free Germany from the domination of Napoleon. At the conclusion of field service he was placed in a comfortable position in the royal mineralogical museum of Berlin, but an eagerness to engage in the work of teaching, to him a mission, drove him out into a life of narrow want and privation. Several years were spent in various schools in Germany and in Switzerland. With friends he undertook the establishment of a school to carry out his ideas, but it was not a success. He was employed by the canton of Berne as director of a cantonal orphan's home, but his wife's health was such, it is said, that she could not endure the effects of mountain air.

Finally, in 1837, he made arrangements to open a school in Blankenburg, in which to carry out his peculiar ideas of education. Here the name "kindergarten" occurred to him while taking a walk. The first actual kindergarten, says Lindner, was opened June 24, 1840, the four-hundredth anniversary of the discovery of printing.

Other kindergartens were established. Froebel was hopeful, when suddenly a bolt fell from the sky. The Prussian minister of education, such was his authority, in 1851 sent forth an order that "on account of their close connection with the destructive tendencies in church and state" all kindergartens should be discontinued. To cap the sum of his miseries, Froebel's faithful wife, the sharer of his poverty, died. He gave the rest of his life to raising the ban placed on his work. A progressive minister came into power, Diesterweg of local renown, and after ten years kindergartens were permitted to reopen.

The seventieth anniversary of Froebel's birthday was made an occasion of rejoicing. After a long waiting, light began to appear. Educators began to realize that he stood for an idea. It is pleasant to relate that, on entering a schoolmasters' meeting at Gotha, those present rose to greet the old man and hailed him with a threefold "hoch." Tears of joy, it is said, streamed down his face at this recognition. He was indifferent seemingly to money and position, but he, like the true schoolmaster, coveted the esteem of his fellow men. He died June 21, 1852.

Froebel's writings are not easily understood. His ideas may be gathered more readily from the writings of his successors. His work is not to be measured by the kindergarten alone, but rather by the impulse he gave to gentle methods and kindly intercourse in the schoolroom. His ideas of primary education were taken up by a lady of social standing, wealth, and education,—the Baroness von Marenholz-Buelow of Berlin. She became the apostle of the kindergarten. She established kindergartens at Berlin, Hamburg, Paris, and elsewhere, and she saw to it that the attention of the world was gained by an attractive kindergarten exhibit at the World's Fair held in London in 1854.

Froebel's birth was obscure, his life was one of struggle, his death was unnoticed; but the hundredth anniversary of his birth was celebrated in a manner befitting the memory of one whose ideas have encircled the globe. In childhood he was called "that moonstruck child," and in advanced years an "old fool," but he never gave up an idea. Even on his deathbed he exclaimed, "A truth cannot die." In Thuringia, among the green hills where he was born, the seven letters

FROEBEL

are cut deep in the face of an overhanging rock. There is no other inscription. None is needed. The world knows Froebel.

See KINDERGARTEN; PESTALOZZI.

Frog, a genus of amphibious animals with an interesting life history. The eggs of the females are deposited in marshes and ponds in jelly-like masses or strings. These float about in warm shallows for a month, when they hatch out into tadpoles or pollywogs. The tadpole has a tail but no legs; gills, but no lungs; and a circulatory system like that of a fish. It has a horny beak and a digestive tract suited to vegetable food. A school of tadpoles may be seen nibbling the edges of aquatic leaves. As the tadpole grows the gills fall away and the hinder legs show themselves, then the front legs appear; the tail and beak waste away; a change of heart takes place; and the digestive system is modified to suit animal food. Bones, muscles, blood vessels, and skin are changed for new and entirely different ones suited to a different life. In a few weeks' time the egg becomes a tadpole and the tadpole becomes a frog, able to breathe air, to swim in water, or hop on land, to catch insects with its long, sticky tongue, and to croak worse than a raven. Thousands of tiny frogs coming out of the tadpole stage at the same time, often overrun a locality, especially after a rain, giving an impression of a frog shower. A frog is four years getting his full growth, and is supposed to live ten or fifteen years. The frog has no ribs.

Frogs' legs are a staple article of diet, especially in France and in restaurants effecting French cookery. Certain ponds and extensive meadows near Paris are devoted to raising frogs for the city market. They are caught by means of nets. American cooks use half a million pounds of frogs' legs a year.

The hoarse croaking of the frog is made chiefly by the male and is reinforced by large air sacs, one in each side of the neck. Frogs live chiefly on an insect diet. On the approach of winter they dive into the mud in the bottom of the pond and remain in deep sleep till spring awakens their melodious music again. Ordinary frogs are aquatic. Tree frogs, of which we have several, have sticky toe pads, enabling them to cling to the bark of trees. Some of the common frogs are the leopard frog, the pickerel frog, the wood frog, the green frog, and, loudest of all, the bullfrog. There are in all several hundred species. Nothing has been said of the jumping power of the frog. It would be an interesting problem to take the weight of a frog and of a person, and the length of a frog's

1. Flying frog. 2. Horned frog. 3. Jumping frog. 4. Grass frog.
5. Moor frog. 6 Pond frog. 7. Spawn. 7a. Tadpoles in various stages.

FROGS.

jump, and compute the relative distance to which a person should jump to keep up the comparison.

The frog has had frequent mention in literature. According to one fable, the frogs had a log to sit on, but were not content. They prayed Jupiter for a more active sovereign than King Log who did nothing. Jupiter sent them King Stork who ate his subjects by the score. Another fable runs to the effect that some foolish frogs, envying the stature of an ox, puffed out their cheeks, and blew so mightily in an endeavor to swell up as large as the object of their envy that they burst their sides.

See TOAD.

Frohman, Charles (1860-1915), and **Daniel** (1853-), American theatrical managers, prominent members of the theatrical syndicate organized in New York in 1895. These men, who were brothers, were born at Sandusky, Ohio. Daniel, the elder, worked for five years in a New York newspaper office, but early became a theatrical manager with traveling companies. He has since managed a number of theatres and theatrical companies. He is manager of Daly's Theatre, New York, the Daniel Frohman Stock Company, is manager and part owner of the New Lyceum Theatre, New York, and is vice-president of the Famous Players Film Company.

Charles Frohman, who lost his life in the *Lusitania* disaster of 1915, began his managerial career with a traveling minstrel show; and after acting as manager of several other traveling companies he established himself at the Empire Theatre, New York, in 1893. After obtaining control of such theatres as the Criterion, Garrick, Museum, Knickerbocker, Madison Square, and others in New York, and the Duke of York Theatre in London, Mr. Frohman organized and directed the New York theatrical syndicate. He brought out as stars John Drew, Maude Adams, Julia Marlowe, and other now famous actors, and in 1905-06 he managed E. H. Sothern and Julia Marlowe in their series of Shakespearean plays. Charles Frohman was very influential in perfecting the existing system of exchanging successful plays between England and the United States.

Froissart, frois'art, **Jean** (1333-1410), a French writer and traveler. His principal work is a history of his own time, generally spoken of as *Froissart's Chronicle*. It covers a period extending from 1326 to 1400. This writer gives a series of vivid pictures of events connected with the history of France, England, Scotland, and Spain. He is considered a fair-minded, truthful chronicler of events. In the absence of newspapers or even printed books, historians are much indebted to Froissart for descriptions of the manners, customs, and modes of thought of his day; but he is not considered altogether accurate as to matters of fact.

Frontenac, frônt'nak, **Compte de** (1620?-1698), a French soldier and governor of the province of New France. He fought gallantly in the French army in Italy, Flanders, and Germany. In 1672 he was sent to become governor-general of New France, as Canada was called then. It was under his direction that the famous expeditions of La Salle, Marquette, and Joliet were sent out. Through the jealousy of his rivals he was recalled in 1682, but in 1689 after the province had been almost ruined by mismanagement, he was restored. Then the old enemies of the French, the Iroquois Indians, were severely punished; the English fleet in Hudson Bay was destroyed; frontier towns of New England were terrorized; in 1690 an English attack on Quebec was repulsed,—all this during King William's War. Frontenac's energy and ability were the chief influence in stemming the tide of English invasion that eventually wiped New France off the map.

In 1672 Frontenac built the famous fort bearing his name, on the site of what is now Kingston, Ontario.

Frost. As distinguished from freezing, a frost is frozen dew, and may be local. If the air cools below a certain point dew collects on objects, especially plants; and, if cooling continues, a frost is the result. A frost comes from the escape of heat, not from a cold wind. Any means, — a cloud is best, — that blankets the field or

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